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ANTICIPATING OBSOLESCENCE—A NEW DEMAND ON PRODUCTION MEN

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HOW can we avoid a recurrence of the bad features of this depression? Can anything be done to soften the next blow? This author believes that much can be done if only we look the situation squarely in the face and make our plans properly. We must so combine the technologist and economist viewpoints and analyses that we can avoid extravagance leading to overproduction, and avoid the worst consequences of obsolescence of both machines and men. Efficiency, rather than productivity, must be the new watchword. And flexibility must lend a powerful hand.

MAJOR business depression gives us many things to think about. Unfortunately the greater part of our thinking is directed toward explanation for what has happened and plans to get back to normal conditions. Practical methods for preventing the same thing happening all over again are something we do not seem to reach. Occasionally an idealistic plan is proposed by some student of economics; but such plans are usually impossible of accomplishment without sweeping changes in our whole business scheme.

What steps the individual business leader can take to ward off depression before it strikes his business again is a matter particularly pertinent to discuss now, because some of the characteristics of the present depression are conditions which have been growing worse with each economic setback. Our peaks of pro-

duction have been pushed so high that even slight interference with consumption brings us to the overproduction stage before the machinery can be slowed down. Technological unemployment has been increasing over a spread of years. Capital burden is mounting through the obsolescence of departments, plants and sometimes whole industries, as newer inventions push them out.

Technical Research and Economic Research

SCATTERED about the country, in the 1500 or more research laboratories maintained by industrial establishments, some thousands of chemists, metallurgists and other research engineers are prosecuting an eager search for the improved method, the newly developed material or combination of materials or the ingenious advancement in design which shall

have sufficient market attractiveness to lift their concerns out of the slough of depression.

That there will be many technological advances noted as business commences definitely to emerge from its recent inactivity is certain, because some of the keenest minds in the country are devoted to technical research. Competition between industrial concerns has been getting keener and keener and the pioneering period in the basic natural resources of the country has been passed. Add to these elements the fact that the rapid growth in population has been checked by restriction and reduction of immigration, now at the lowest point in 100 years, and a lower birth rate, and it becomes apparent that the battle for markets will be keen, with science looked to for much help.



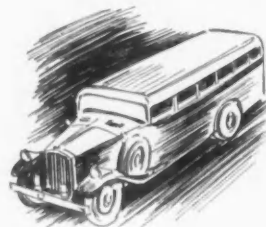
In the meantime, in the banking and other financial houses of the country thousands of economists, statisticians and other experts are studying the records of individual companies and whole industries, plotting graphs and curves of progression and retrogression and using every iota of their accumulated experience and financial wisdom in an endeavor to tell their banking houses and individual clients, from what has been done in the past, what may be expected of industrial concerns, either individually or in the mass, in the way of future operations and earnings.

Bridging the Chasm from Yesterday to Tomorrow

BETWEEN the two yawns the chasm which always separates what was done yesterday from what is going to be done tomorrow. Considering the problem in the light of each individual man's necessity for a job, of the safety of his invested earnings, or of his utter dependence on the general prosperity of his country, it is becoming increasingly apparent that the chasm between yesterday and tomorrow must somehow be bridged. Yesterday's performances must be judged in the light of tomorrow's probable innovations, to lessen the violence of our business fluctuations.

Safety for investment and stability of operations and employment are going to require executive and financial management to lean as heavily on technology as production and marketing does. To the research engineer on the one hand, dealing with new wonders, and the statistical economist on the other, dealing with past performances, must be added a new adviser, the technological economist whose task it will be to combine the study of past performances with future possibilities, and so furnish a basis on which intelligent management can proceed in orderly fashion.

Without in any way minimizing the debt we owe to science for the



continuous changes, even though they be changes for the better. Plant obsolescence has brought capital obsolescence and loss, and human obsolescence has brought unemployment.

American business men are noted for their ability to grasp quickly the possibilities of the new invention or method and plunge into its development to the fullest extent. But they are almost equally ready to consider each new thing the last word in its line and go into it as though it were never likely to be replaced, or be made by competitors in quantities and at prices which would glut the market.

Competition and the Railroads

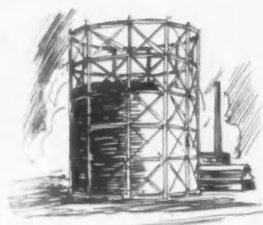
JUST now the railroads of the country are in a bad way and are pleading for relief to save them from financial disaster. Much credit must be given to the railroad systems for their development of the nation, but at the same time it must be admitted that if railroad men had kept an eye on the future many of the conditions they are suffering under today would not exist at all.

By the time the bus and truck lines developed to a place where they were offering real competition, putting the electric lines out of business almost entirely and cutting seriously into the business of the steam roads, railroad men were willing to take on some bus lines as feeders. But they have not yet done anything about the freight business they have lost to the trucks, except to talk about speeding up freight trains and suggest higher rates; or higher long-haul and lower short-haul rates, which would greatly assist long-distance oil and gasoline pipe line construction.



Power Production and Competition

BUSINESS of the future cannot expect to stand pat on its own ways and refuse to admit that there are any other ways. The power situation is a wonderful exposition of that. For many years we hauled coal on the railroads and generated steam to furnish power and heat. Hydroelectric power was held up as the wonderful agent for getting away from the expense of steam power. But improvements in coal-burning devices have so greatly increased the heat output of a ton of coal that hydroelectric projects, which in addition to the necessarily costly generating installation require the building up of a great artificial head of water-power, cannot compete with



steam generation, except of course where the hydroelectric project is for flood or navigation control and the electric energy is in the nature of a by-product.

But now comes the long-distance piping of natural gas. In the development of the petroleum resources of the country almost untold reservoirs of natural gas have been discovered. For some time they could not be used because they were too far from the markets and pipe lines were too costly. New pipe-making methods, however, have made larger, lighter and stronger pipe available and there are now several pipe lines 1000 miles or more in length in operation or soon to be completed.

One might say, then, that the natural gas industry could go ahead without fear of competition, so long as amortization of the pipe line and pump costs was accomplished before the exhaustion of the known gas reserves, which run into trillions of feet. But gas is no more certain of its future than coal, for there is available a source of heat units now almost entirely going to waste which constitutes most formidable potential competition.

Competitive Gases Now Available

PROPANE and butane are recovered from natural or casing-head gasoline and in oil refinery operations. Except for field boilers in the petroleum districts little use is being made of these elements. Some butane is condensed and shipped in drums or tank cars for use in communities where the market is so small that other gas cannot be economically furnished. Butane vapor has 3447 B.t.u. per cubic foot at 32 deg. F., and propane 2685. Natural gas has seldom more than 1100.

Either propane or butane liquefies at comparatively low pressures. A 6-in pipe line, for instance, would carry from the mid-continent fields to St. Louis, Chicago or Eastern points, liquefied butane or propane which, mixed with air for direct use or added for the enrichment of coal or water gas, would contain many more heat units than the largest pipe line known could transport in the shape of natural gas. From these two gases heat units are available equal to about two-thirds of all the natural gas consumed in the country outside the oil fields. But little of it is being used.

Thus each source of power now being used has formidable competition, either actual or potential. The safety of the millions of dollars being invested in light and power companies, and the other millions being invested in manufacturing concerns which make their equipment, depends on an accurate appraisal of this potential competition and particularly depends on these industries guarding against an over-expansion which



will invite that competition and leave them top-heavy when it comes.

Flexibility in Meeting Changed Conditions

TRANSPORTATION, light and power are large-scale examples of the necessity for gaging the future. Many individual lines of industry have similar problems.

I recall one large company which has completely changed its line of manufacture three times in the last 25 years. Originally a business of considerable magnitude was built up in gas-lighting equipment for automobiles. When automobile designers decreed electric lights, the business was changed to lighting batteries. Then generators were installed; batteries became smaller and the business was split up by the entry of a number of other markets. But the radio was coming along and the addition of a line of radio batteries kept up the volume. Again science stepped in, with the light-socket radio set, so this company cheerfully extended its lines to include radio tubes, and turned its battery business into making heavy batteries for electric baggage and factory trucks. Not all companies have been so adept at quick change.

Just now the steel business is undergoing a number of radical changes. For many years, as business mounted higher and higher the urge was for more and more tonnage. In recent years alloy steels have been produced which give the strength without the weight. These steels have created new markets, to be sure, but at the same time they have destroyed other markets. Where a 10-lb. piece of alloy steel has all the tensile strength of 50 lb. of carbon steel, plus a toughness and a finish that the carbon steel could never have, it is of course preferred in most places.

And the tonnage lost in decrease of weights will account for much of that gained in new uses of steel. Welding, too, has been carried so far that welded sheet steel is replacing steel castings for many uses. Tonnages of steel may not increase so much in the near future.

New Developments in Flat Rolled Steel

BECAUSE of the mounting tonnages of recent years the steel business is particularly susceptible to the urge for expansion, possibly beyond a point which the coming years will justify. Some of the larger companies have installed continuous sheet mills. These are very expensive, costing \$7,000,000 or \$8,000,000. One of these modern broad-strip mills has a capacity of nearly 40,000 gross tons a month of 16 to 18 gage product, equal to 40 or 50 of the old-style mills. The numerous widths and gages making up the daily rolling schedule naturally affect the production and consequently the cost, and idle time may cut heavily into cost savings.

The practical advisability of these costly continuous sheet mills will depend almost entirely on the assurance of sufficient market to keep them operating at capacity enough of the time to give a sheet tonnage

which will carry the great investment necessary and still show a cost reduction.

Again, keen competition is in the offing. New processes, perfected so far on cold-rolled sheets only, but appearing to be feasible on the material made by the continuous mills, have an initial cost which can be met at lower capital investment. It is possible that a mill of the new design may be developed in the future for not much over \$1,000,000 which will have a capacity of probably one-fifth that of a continuous mill. One-fifth capacity on one-sixth or one-seventh the installation cost means economy of operation and less danger of loss in slack periods.

These new processes for cold-rolling steel permit the rolling of thinner sheets than have ever been known in the steel industry. Steel sheets one-thousandth of an inch thick—hardly thicker than tissue paper—are being commercially produced. This new process has particular application in the stainless and alloy steels, for which new uses are being found almost daily, and in the production of tin plate. These new mills may open markets hitherto unknown for steel and, by the same token, may crowd out some existing manufacturing equipment and create more capital obsolescence.

Management Is Between Two Fires

ACTUAL or impending developments in the steel business, such as welded pipe and new sheet steel processes, not only decrease costs but increase tonnage. If every pipe and sheet manufacturer should provide the new facilities, a tremendous overcapacity, vastly greater than now exists, would follow. On the other hand, if the old facilities are competitively obsolete, commercial survival demands adoption of the new.

In varying degree this difficulty faces many industries. The producer is cast upon the horns of the dilemma created by science, and creative science can be very destructive. The obvious conclusion is that, in all such cases, decision as to the procedure to be followed necessitates careful preliminary investigation of markets, fixed and working capital charges required by the new facilities and many other factors. Hastily adopting a new improvement because it is technologically correct, and the money can be borrowed to pay for it, is an increasingly unsound procedure.

Efficiency Will Be the Keynote

INDUSTRIAL development of the near future, in my opinion, will resolve itself into a keen race for efficiency of production rather than the race we have witnessed in recent years for expansion of production facilities. This depression, in its suddenness and its severity, has shown that our production facilities, from the standpoint of mere quantity, have been extended as far as they should be for some time. Industry must settle down now to a policy of improving the quality and the efficiency of manufacture of its products; of making its plants produce more and better goods at a lower unit cost, rather than widely



extending existing plant capacity.

An illustration of this point is furnished by a small oil refinery built not long ago. Small refineries are not usually practical, but this one was located in the center of a triangle between the nearest large refineries, had pipe-line supplies of crude oil and a local market and seemed to have a chance. It was built for 1000 barrels a day capacity, but try as they would the owners could never make it pay. Recent changes, however, putting the capacity up to 1800 barrels a day, have taken it out of red ink. Existing facilities made more efficient did the trick.

Enter the Cycle of Exact Business Organization

AMERICAN business has seen two distinct and important periods or cycles. During the last half of the nineteenth century we went through the period of discovery and development of natural resources, with the attendant introduction of products which those resources made possible. Following this period came an engineering period, during which scientific investigation became a part of industry. This period saw the refinement and combination of basic resources to produce new materials, which greatly widened the scope of invention. During this period we have stepped blithely from one wonder to another, creating vast new markets and throwing on the scrap heap the facilities for making outmoded merchandise.

We have come now to another distinctive period, or cycle, in which business must be organized. Science will take as great a part, or greater, and many new inventions and improvements will be brought out. That fact must be recognized. Possibly the greatest change that industrial leaders need to make in their thinking in this new period is to recognize that science will advance continuously and that no improvement can be considered really final.

Business Should Meet Obsolescence in Advance

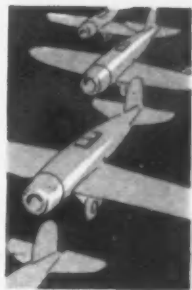
THAT means that business must go to meet its obsolescence, instead of being attacked by it without warning. To the charts of past performances furnished by statistical economists must be added a careful appraisal of the future effect on production methods and costs, and on market possibilities, which technological advance may make. With these things taken into consideration changes may be made more gradually and some considerable part of the obsolescence of machines and men avoided. Meanwhile, financing will be on a basis which will forecast obsolescence and amortize its cost in time to prevent the danger of loss to investors.

American business, recovering from this depression, will certainly go on to a different, sounder and more stable basis. The necessity is so to order the future that we can stay on the road and keep going, rather than be running off into a swamp of overproduction and unemployment periodically. And steps must be taken to guard invested capital against undue obsolescence resulting from scientific development.



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HARBINGERS of better times. For countless ages man envied the flight of birds. Then, through persistent effort, plus the evolution of materials and motive power, he achieved it. Can it be thought that these same qualities of determination and skill will not finally lift mankind above the dark clouds of depression hazards?



SUCCESSFUL OPERATION BASED ON

AN intelligent sales policy, accurate costs, very close estimates, efficient shop equipment and workmen of more than average skill have brought the City Machine & Tool Works, Dayton, Ohio, unusual success. The operating principles of this company—coordinated to back up its sales policy effectively—are outlined in this article.

WITH profit margins narrowing and small companies finding the pressure of competition from large corporations increasingly acute, the success of the smaller manufacturer today seems to depend more than ever on formulation of an intelligent merchandising program, recognition that his product should be priced only after an accurate appraisal of its cost has been made, and the setting up of production on an economical basis by equipping his plant with modern tools.

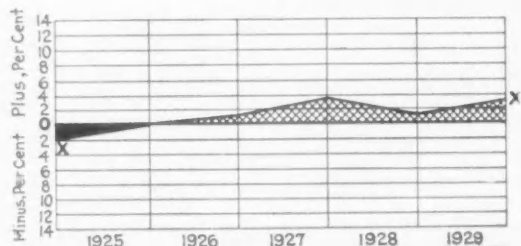
Close adherence to these basic principles is responsible in large measure for the success of the City Machine & Tool Works, Dayton, Ohio, maker of machine tools and toolroom equipment. Its selling program is built around the idea that the company is to be regarded as an auxiliary toolroom by customers. It naturally does not try to give the impression that it can completely take the place of a toolroom in a large establish-

ment, for emergency service demanded in such cases could not always be given at a sufficiently low rate to be profitable either to the company or the customer.

Even the smaller shop can become the victim of a "one-product" policy. That is, it can concentrate all of its resources in support of a policy of making only one article, with the result that in a period of depression it probably will be much more severely affected than if it had a diversification of products. The City Machine & Tool Works learned this in the lean days of 1921, when it was depending entirely upon special work to keep its shop busy. Since then

it has rounded out its production to include a standard line of gear burnishers, tooth chamfering machines, grinding and boring chucks and diamond boring machines; this action has helped stabilize its business.

The company has retained its cost records since 1914. As a consequence of this far-seeing policy, it has been able to estimate the time required



The above graph comparing the estimated time with the actual production hours required on work received is kept by the company for checking the accuracy of its estimating. The zero line represents the production hours, while the line X—X' indicates the estimated hours. In the five-year period, the average estimated times exceeded the actual by less than 1 per cent.



Work benches are placed next to windows. Each tool and die maker has a surface plate which rests on a portable stand.

ED ON COORDINATED POLICIES

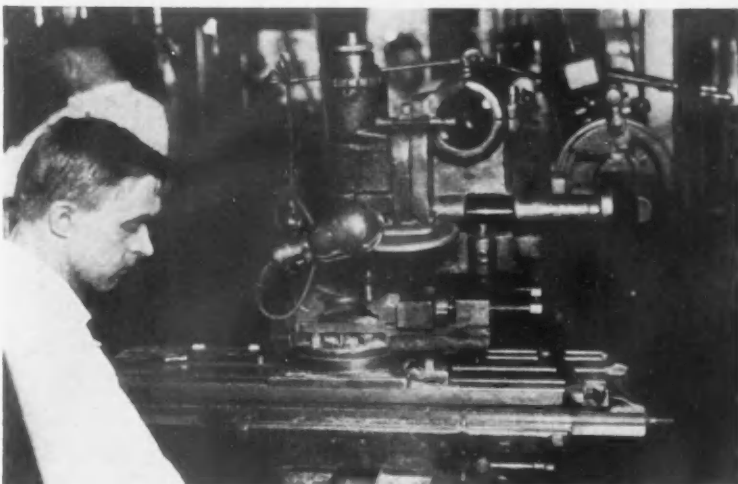
By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

to do a job, so that in the past 10 years it has varied less than 2 per cent from the actual production hours.

It likewise has found it desirable to employ workmen skilled above the average. The men are paid an hourly wage for 9 hr. a day, with extra compensation for overtime. After investigation and use of various wage incentive systems, the company believes that this simple plan is the best for its particular requirement, although realizing that changing conditions might necessitate altering it. Administrative officers and shop foremen, on the other hand, participate in a bonus.

A plant maintenance program has been worked out so that machinery is rebuilt and the shop put into the most efficient condition during slack periods. This leaves the entire working force free to concentrate on work at hand during peak operations.

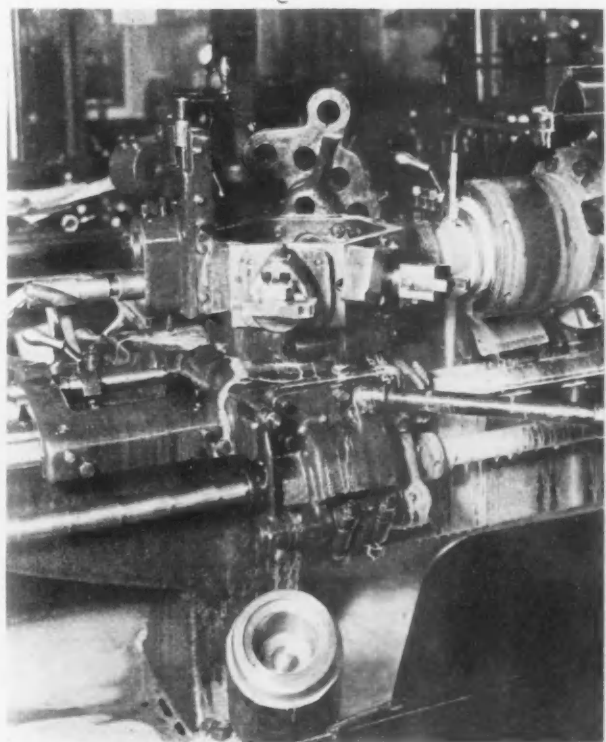
The method used by the company in keeping cost



Machining part of a die for a rear axle housing.

records has been stripped of non-essentials, yet is complete. The estimating department puts on an "estimate sheet" a detailed description of the labor and material required to do a job, estimating the time for each operation. In the shop the workmen have yellow "job cards" which are filled out for every job on which they are engaged. This card is 3 x 5 in. and gives the following data: name of operator, department, shop order number, time started, time finished, actual time worked, overtime allowance, total time, total cost and rate per hour. The card is signed by the foreman before it is sent to the office.

As the yellow cards accumulate, the information on them is transferred to a "shop order time record," which is a large yellow sheet. On a white sheet of similar size is the material record. Data from the yellow "shop order time record" and the white "material record" forms are summarized on the reverse side of the "material record" sheet under the heading "cost and billing record." The cost summary here includes the material cost, labor cost, hours overhead, total hours on the job, hours actual time worked, hours estimated and total cost. At the bottom of the card is a summary of re-operation work, where a piece has been spoiled and machining operations must be repeated. This contains the material cost, hours of labor cost, hours overhead and total cost. This cost then is charged to the man responsible for the loss and the reason for the rejection of the piece is described. Billing data are added as follows: total material used, percentage handling





Turret lathe operation on a forming die.

[illegible]

THE labor and material requirements for every job, with estimate of cost of every operation, are listed on this estimate sheet by estimating department.

AN inspection report is made out for every job. On one side is recorded inspection in process, on the other side final inspection.

S. O. No. _____ Date Issued _____ Date Finished _____	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div> City Machine & Tool Works INSPECTION REPORT </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="text-align: center;">Dwg. No. _____</div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> SYMBOL </div> </div>	P. O. No. _____ SHIPPED _____
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Quantity	DESCRIPTION	

PROCESS INSPECTION						
Date	Quantity	Detail No. or Part	Stereoscope Test	REPORT	Rejected	Passed

charge, total material charge, cost of designing, shop labor cost, and total of invoice.

Re-operation Time Accounted For

For spoiled work a "re-operation time" card is filled out by the foreman of the department in which the responsibility rests. The card bears a note that "start account of time is kept by operation. If you are having trouble with this job for any reason, give an explanation here." This is a time card resembling the job card used on each operation, except that it is red against the latter's yellow. The name of the man who spoiled the work is put on the card.

which is looked over by the management. The fact that the man who fails to do his task efficiently is singled out in such manner has a salutary effect and has helped to keep losses at a minimum.

An inspection report is kept for each job going through the shop. On one side it provides for reports of inspections during processing and on the other for final inspection with comments on the following points: Pattern casting; location of holes; location of pins and stops; locating blocks; drive and slip fits of bushings; fit of dowels and screws; ground surfaces; ground diameters; ground and lapped holes; die subpress; shut-height-parallel;

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Cost data are summarized on a cost and billing record, which tells at a glance the cost of every job.

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ELECTRONIC CONTROL OF



THE photo-tube (at right) is hooded to exclude light from extraneous sources, and an amplifying relay is contained in the box at the other end of the cable.

By **RAYMOND FRANCIS YATES**
Member Institute of Radio Engineers

DURING the past three years some two hundred new uses for electronic devices have been found, many of them pertaining to the automatic control of both heavy and light machinery. At the present time new applications are being developed so rapidly that even an alert student of the subject has a difficult time keeping himself informed. Every day, factory superintendents and shop men are being called upon to acquaint themselves with the operation and underlying theory of photo-electric tubes, thyratrons, vacuum tubes and grid-glow tubes. All of these devices have been successfully applied to various problems of machine control in a wide range of industries.

Inasmuch as the photo-electric tube or cell is sensitive to changes in light intensity and color as well, it may, in a measure, replace the human eyes and consequently has found many applications. The theory of this device is very simple and the device itself is simple considering the wonderful things that it is capable of doing.

The components of the photo-electric tube are simply an anode and a cathode sealed in a glass tube with terminals arranged in the base. The cathode of the photo-electric cells is sensitized with a metal from the alkaline group, usually sodium, caesium, potassium or rubidium. The anode takes the form of a metallic grid occupying such a position in relation to the cathode that light, before striking the latter, first passes through the anode.

Electrons Are Released by Light

When light strikes any one of the metals mentioned above, energy is released in the form of a pure electronic discharge from the surface; that is, electrons, the same kind that go to make up electric currents flowing through wires, are released and carried rapidly

toward the anode. Perhaps the beginner will be greatly assisted by referring to the diagram, which shows a simple circuit involving a photo-electric tube, a polarizing battery and a sensitive electric meter capable of measuring micro-amperes. Electrons, being negative particles, are attracted to the anode, which is made positive by the battery. Light striking a photo-tube under these conditions will cause a minute current to be registered on the electric meter.

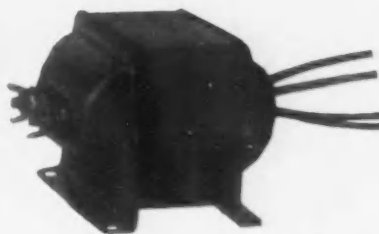
The magnitude of this current will depend upon several factors such as the nature of the metal used on the surface of the cathode, the potential of the anode, the color of the light and the light intensity. In a larger measure, it will depend upon whether the cell is of the gaseous or vacuum type. Cells containing inert gases such as argon, produce higher voltages because of the phenomenon known as "gas amplification." In any event, the voltage produced by a photo-tube is of a very low order and it is always necessary to pass this weak current through amplifying vacuum tubes until it is built up to a point of intensity, where it can operate relays and circuit breakers. Thus a current of a few micro-amperes can be made to control even the heaviest machinery.

Proportion of Light to Current Intensity Is Linear

In the vacuum type of photo-electric tube, the relation between the light flux or intensity and anode current is linear to a high degree of accuracy while in the gas filled type this relation has a slight curvature, although for ordinary purposes it may be considered substantially linear. It should be borne in mind by those who proposed to apply the photo-electric tube that this property is important for it is upon this characteristic that most applications are based.

The amount of voltage applied to the tube is also of great importance for the applied voltage determines the initial velocity of the electrons leaving the cathode

ROOF MACHINERY



ELECTRONIC tubes, originated by the physicist and radio engineer, are being increasingly applied in various fields. The light-sensitive photo-electric tube, or cell, as it is commonly termed, is successfully used to control many mechanical devices; its power can be increased to the required degree by amplifying tubes and relays. The simple principles of its operation are discussed in this article. Two supplementary articles will describe applications in the metal-working industries.

TYPICAL lamp designed as source of light for photo-electric tube operation. The small transformer is to reduce line voltage to that required by the small lamp.

and hence the current produced by the tube. It may run anywhere from 30 to 300 volts, depending upon the design of the tube; many of the tubes now available use about 90 volts. It is at this voltage that the electrons from the metal reach their maximum speed in their flight from the cathode. Any further increase in the voltage would fail to increase the efficiency of the tube and it is at this point that the cell is said to be saturated. Should the voltage be increased beyond a certain definite limit, a faint blue glow will be in evidence and the photo-tube will in all probability be ruined. Consequently, it is important that tubes

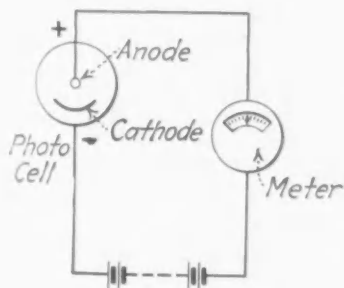
comparatively great amplification is sufficient to operate a small relay. For light operations, such as counting, this amplification might not have to be carried further. However, in the control of heavy machinery, more amplification must be provided and it is here that the thyatron tube serves its purpose. It is obvious that a series of relays cannot always be employed for the time lag would be too great and the necessity of caring for a large number of contacts, some of them carrying rather heavy current, would not make for operating efficiency.

Thyatrions Conduct Comparatively Heavy Currents

The thyatron is a pure electronic device which has an anode or output current of the order of several amperes that may be controlled by small changes of the grid voltage. In a system making use of the photo-tube, the vacuum tube and the thyatron, the thyatron grid is controlled by the output of the amplifying vacuum tubes in such a way that when the illumination on the cathode of the photo-electric tube reaches a certain value (which may be exactly predetermined) the thyatron very suddenly conducts currents of several amperes which, without further amplification, are sufficient for the direct operation of power contactor coils, large solenoids and other control equipment. When the light decreases, the thyatron stops conducting. By the use of this device an amplification from micro-amperes to amperes may be brought about with a time lag that is only a very small fraction of that which would be necessary if ordinary relays were employed.

Recent research has made it possible to employ photo-tubes, vacuum tubes and thyatrions in such a way that the output from the thyatron is continuously varied as a function of the illumination on the photo-electric cell.

To sum up, there are at least three systems for
(Concluded on page 1077)



should not be operated at voltages beyond that specified by the manufacturers. This is particularly true in connection with gas-filled tubes.

Photo-Electric Current Must Be Amplified

As before stated, photo-electric currents must be amplified before they are capable of operating relays. Ordinary vacuum tubes such as employed in radio circuits can be used for this purpose. These may be made to operate either from a.c. or d.c. circuits. The circuit is so arranged that a small change of light causes a change in the grid potential of the vacuum tube. This results in a proportionate change in the plate current of the amplifying tube or tubes, a change that may be measured in milli-amperes. Naturally the



RIVETED AND WELDED STEEL

CARBIDE precipitation or intergranular corrosion is a vexing problem, whether due to welding or some other cause. The author, in this continuation of his article published in *THE IRON AGE*, Oct. 8, gives his views of this problem with particular reference to welding. There are circumstances under which the welding of rustless steels is possible. The use of higher chromium alloys is predicted.

THERE is one outstanding difficulty that has led to many disastrous results—the instability of the 18 and 8 combination. By this I mean, of course, the possibility of any operation allowing this austenite to begin to transform. This would, of course, immediately introduce a different metallographic structure and it is this condition that the chemical engineer and fabricator should know more about.

"Carbide Precipitation" and What It Means

When we introduce welded metal of 18 and 8 into plates of 18 and 8 we are, of course, again confronted with heat transfer as represented by a heat gradient away from the molten metal to the point where the heat is dissipated into the adjacent material. Experience has also taught us that in a temperature

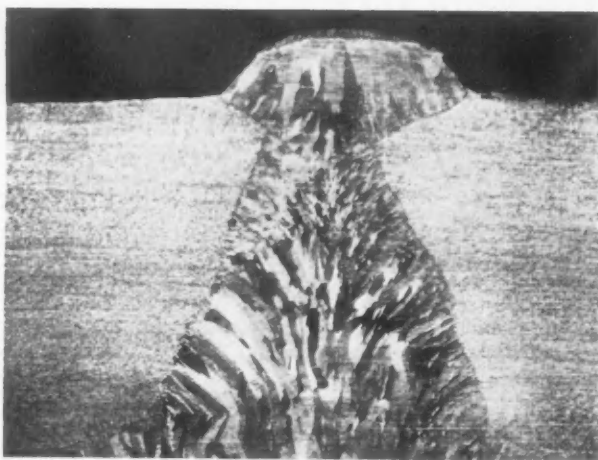


FIG. 1—Photomicrograph of 18 and 8 plate welded with 18 and 8 welding rod taken at a magnification of about 6 diameters. The difference in the structures of the cast and wrought metal is quite evident. Also note the tempering effect in the larger part of the weld due to the heat produced by the introduction of the second or smaller weld.

range of from 1000 to 1200 deg. F. the austenitic condition of the 18 and 8 is very susceptible to modification. This modification is very flippantly referred to today as "carbide precipitation" (a published view of the author's opinion on this subject will be found in his paper before the American Iron and Steel Institute already referred to).

It is suggested that at this temperature carbon goes out of solution at the grain boundaries forming carbide of chromium and maybe carbide of iron, taking the chromium from the immediately adjacent film to the crystal boundary, thereby producing a condition illustrated simply by Fig. 2.

Now under these conditions we have an extremely unique structure. It is possible, if the author has made himself clear, to assume that we have an austenitic crystal containing 18 per cent chromium with 8 per cent nickel, enveloped within a film of material that has been impoverished of chromium and may be, say 10 per cent chromium and 8 per cent nickel, and at the grain boundaries carbides of chromium as illustrated in photomicrograph, Fig. 3.

We do know that, if we take material in this condition and submit it to certain drastic etching tests, such for instance as 10 per cent copper sulphate and 10 per cent sulphuric acid in water at the boiling point, we can get corrosion through the crystal boundaries, to a point of complete disintegration. The author feels that what really happens is that the sulphuric acid-copper sulphate solution actually travels through the impoverished film of material which is so reduced in chromium content that it does not possess sufficient of this element to maintain resistance to the corrosive attack. Synonymous with this change the material becomes slightly magnetic which is, of course, indicative that some of the material has transferred from the gamma iron phase of austenite to the alpha iron phase of the ferritic series.



THE RUSTLESS STEELS

By T. HOLLAND NELSON

Consulting Metallurgist,
Philadelphia

Experience has shown also that, after producing this condition, by heat treating at temperatures from 1700 to 1800 deg. F., this intergranular attack can be substantially retarded, if not prevented, but micrographically we still have carbides present at the grain boundaries. The author's view of this is that, by heat treating in this temperature range, we have used a temperature at which chromium can re-diffuse from the mass of the crystal into the impoverished film, thereby producing again almost a homogeneous austenitic structure, or in other words we have removed the impoverished alpha iron film around the crystal (the material again becomes non-magnetic) but the temperature is not high enough to allow the carbides to go back into solution. Under these conditions the carbides do not seem to be particularly dangerous, and, if the temperature is raised to approximately 2000 deg. F., then the carbides themselves go again into solution and we have a homogeneous austenitic structure throughout.

Effect of Welding on Carbide Precipitation

With this thought in mind, therefore, let us revert again to a weld. In welding this material, at some point in the heat gradient we have in all probability an area in which carbide precipitation has taken place as intimated above. This area is one that in certain acid solutions would be rapidly attacked. As a matter of fact, the writer has seen welds submitted to drastic tests where the material adjacent to the weld has been eaten completely away, whereas the weld metal itself remained perfect and the wrought metal away from the heat gradient also remained perfect.

This is due, I believe, to the fact that the weld metal, being quenched rapidly, would be, naturally, in the austenitic condition, in other words in the ideal condition for the metal to meet corrosive attack. The wrought metal away from the weld would also be in

an austenitic condition and therefore in an ideal condition to resist attack but the material adjacent to the weld, which had been subject to disturbing influences of the heat gradient, could contain material in the transition stage, known more familiarly as the area of carbide precipitation.

In instances such as this, again one could readily and logically say—heat treat the installation and remove these conditions. Metallurgically this is very simple and would undoubtedly remove the obstacle, but again we are confronted substantially by the size of the equipment, by the furnace capacity and by the fact that the structure itself would probably collapse

FIG. 2—Diagram illustrating principle of carbide precipitation and areas impoverished of chromium at crystal boundaries (below).

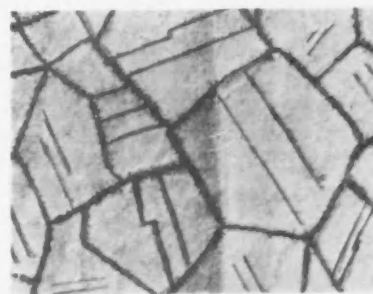
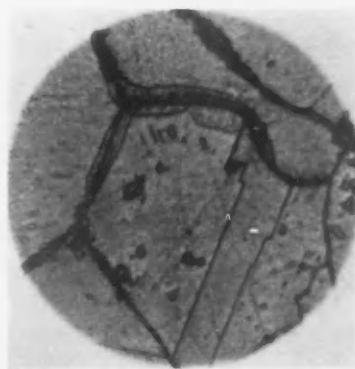


FIG. 3—Photomicrograph taken at 1200 diameters (reduced about one-third) of material held for 30 min. at 2000 deg. F. and quenched in water, then reheated to 1200 deg. F. for 48 hr. and cooled in air (above).

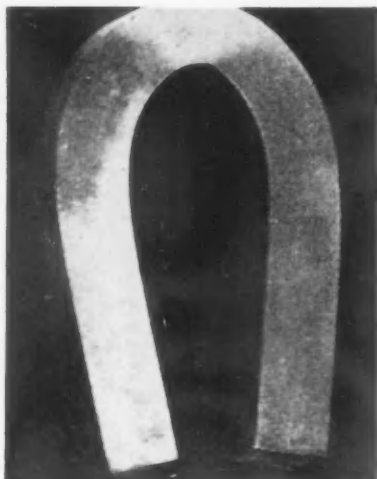


FIG. 4—Cooled in air from 1800 deg. F. and submitted to copper-sulphate solution.

long before it had attained the temperature to produce the ideal condition. Therefore, this explanation does undoubtedly justify the present tendency of fabricators to heat treat where possible at the highest temperature at which it is possible to properly support the structure.

Not Pessimistic About Welding

It would seem from this article that the author is somewhat pessimistic with regard to welding. May I emphatically state that the contrary is the case. I know of so many installations that I would rather see built of welded design than of riveted design that I am anxious to use every possible means at my disposal to further the welding of alloys of this type. On the other hand, it would be blind folly not to realize the inherent difficulties with which we are confronted.

Now a final word—the author has shown that 10 per cent of sulphuric acid with 10 per cent copper sulphate at boiling point will disintegrate 18 and 8 in which carbide precipitation and chrome impoverishment is present. This is true, but it also should be borne in mind that very few commercial houses are handling a solution of this type. It is a laboratory indicator of a condition. It is not a commercial solution being used by various process industries and in this thought lies a great deal of confidence to those considering the use of welded corrosion-resistant alloys for chemical equipment.

Welded Structures Can Be Used

There are many conditions where corrosive solutions cannot be handled in ordinary mild steel; there are many conditions of corrosion that would not attack welded structures even if carbide precipitation were present, so that there is no reason at all why welded structures cannot be used in the chemical industries for a variety of purposes.

In starting out there was a tendency by all to make the broad and sweeping statement that these alloys could be welded. Experience has taught us a great deal and today we realize that the statement cannot be accepted without further qualifications if the material is to be subjected to corrosive attack.

In this article I have endeavored to cover the chromium series, as well as the chrome-nickel series, and it is perfectly obvious that the chrome-nickel

series are the ones that we shall look forward to when considering welded structures.

Higher Chromium Alloys Probable

May I go one step further and state frankly that, for drastic corrosive conditions, I do not believe that 18 and 8 will prove the ideal combination but that we shall steadily develop other combinations of chromium with nickel in which I venture to say there will invariably be upward of 18 per cent chromium present, such, for instance, as chromium 25 per cent and nickel 10 per cent; or chromium 25 per cent and nickel 20 per cent in one series; and say nickel 30 per cent and chromium 20 per cent as representative of other types, in which either the tendency to transform from one condition to another is retarded or entirely eliminated, or on the other hand in which there is always sufficient alloy content to negate physical differences which may be produced by the welding art.

It is interesting in looking back over the chemical equipment used in various parts of the world to find that the largest installations in the United States have been made from the straight 16 to 18 per cent chromium alloy and it is probably only natural to find in Europe, which is substantially the birthplace of the 18 and 8 alloys, that this particular type of material has been used extensively.

Welded Materials Predominate in Europe

With regard to the ever-present argument concerning riveted or welded structures, it is again interesting to note that in the United States the bulk of the equipment is of riveted design, whereas in Europe, according to information before me, the bulk of the material has been made from 18 and 8 of welded design.

From the author's experience there has been in the past considerable trouble with welded structures of 18 and 8 due to corrosive attack; by this I mean, due to intergranular penetration of the material adjacent to the weld. I firmly believe that more difficulty has been experienced abroad with the 18 and 8 welded structures than we have experienced in this country with the straight chromium riveted structures.

However, as repeatedly stated, the author is not offering this information with any intention of condemning welding. There is no chemical engineer who would not in many cases like to have welded structures; such structures would give him smoother surfaces which is an advantage in many processes. It would eliminate the tendency where alternating heating and cooling cycles are involved for rivets to gradually loosen and leak, but at the same time one cannot do other than look at the two possible sources of trouble.

With rivets there is a tendency to loosen up, but invariably this simply means an occasional inspection and recalking. With welded structures, where intergranular penetration has a tendency to occur, there is little to show just what is happening and therefore incipient corrosive attack can continue to the point where failure can become extremely dangerous without apparent indication.

This is the author's frank opinion, looking back over what has been done. For a moment, however,

let us look forward and again mention the fact that the chrome-nickel steels seem to possess so many possible advantages in many directions, and within the last two or three years the art of welding has made such rapid strides that we are able today to say with much greater confidence than has been possible in the past that, for many of the industries, welded structures of chrome-nickel can safely be used.

The only real trouble is that it is seldom possible for the manufacturer to do more than run a series of corrosion tests, in synthetic solutions, of sample test pieces. Under such conditions often misleading results have been obtained and information furnished in all good faith has proved to be entirely in error when the material has been put into a complex working solution.

How Adequate Tests Should Be Made

We are at a point where we can safely use both riveted and welded structures in the various chemical industries, but before deciding on welded or riveted structures it is always advisable to test, in the actual working solutions, material which is truly representative of what a complete installation would contain. By this I mean a simple welded or riveted test piece is hardly sufficient. Such a test piece should comprise material that has been stressed to the extent the fabricator would have to stress it—material that has been welded in such a way that the weld has been stopped, overlaid and started again, as would be necessary in fabricating, local heating or representing whatever physical phase fabrication may introduce into an ultimate structure. It is not difficult to construct such a test piece and one could go ahead much more confidently with the building of large installations after such a test piece had shown satisfactory results.

A word in regard to corrosion tests—usually the extent of corrosive attack is estimated either by the appearance of the material or its loss in weight. In this direction and particularly with samples of the chrome-nickel types submitted to copper-sulphate tests it is advisable to go somewhat further than this. Often intergranular corrosion will take place without leaving any marked appearance of attack upon the surface of the specimen, but if the specimen is ultimately submitted to some form of torsion, immediately the effect of this type of corrosion becomes apparent. This is well illustrated in Figs. 4 and 5.

Both of these specimens appeared to be perfect after withdrawal from corrosive solution. On bending, however, the specimen which had been redrawn to 1200 deg. F. showed very serious disintegration, whereas the specimen which had been air quenched from 1800 deg. F., without any ultimate draw, withstood the bend test without any sign of corrosive attack.

Low Carbon Content Preferable

In discussing these 18 and 8 alloys I have not made particular reference to the carbon content. In this direction may I state that the remarks throughout this article are applicable to all of the 18 and 8 series containing carbon from 0.12 per cent down to say 0.06 per cent, which covers pretty well the commercial ranges of material available today?

FIG. 5—Air-quenched from 1800 deg. F., drawn to 1200 deg., and submitted to copper-sulphate solution.



It is, of course, perfectly true that lower carbon materials are less susceptible to intergranular corrosion than those of higher carbon content, but all the materials so far within the commercial production of the steel manufacturer present this particular problem in various degrees according to the carbon, chromium and nickel ratios and the heat treatment to which the material is submitted.

One might assume that, if it were possible to eliminate carbon almost completely from the 18 and 8 type materials, then we would obviate carbide precipitation as well as chrome impoverishment. We should also probably have a less stable austenite, but inasmuch as in such a case both the alpha and gamma phases would contain the same contents of chromium and nickel we might reasonably expect to avoid intergranular crystalline corrosion with a heat treatment at 1000 to 1200 deg. F. As a matter of fact I understand investigation of this phase has been under way and results would apparently support this theory.

Summation

The author may be accused by some of having raised some very "fine" points in this article; it may be regarded by some as too academic. I feel, however, that the time is opportune to bring out these facts, not as an alarmist, but because familiarity with the difficulties that may arise makes it easier to anticipate them and, where the conditions of corrosion are simple, to discount them accordingly. This would seem a much safer policy than proceeding without a knowledge of such difficulties and encountering them when an installation has been built and fails in operation.

Again let me reiterate that *there are many instances where welded structures can be safely used* and, if due consideration is given to all phases of the problem at the outset, there should be no spirit of rivalry between the advocates of riveted or welded design but a careful selection after due consideration has been given to the various problems involved.

Recent information has been offered suggesting that a titanium content of 0.50 per cent or 1.00 per cent of vanadium upward has a decidedly beneficial effect on retarding carbide precipitation and subsequent corrosive attack. From such information as the author has, the results look distinctly encouraging, but he has not from his own experience had the opportunity of confirming these claims.

HEAT TREATMENT OF BOLTS AND NUTS

By F. O. KICHLINE

Engineer of Tests
Lebanon Plant, Bethlehem Steel Co.

BOLTS are often located at points of greatest strain, where failures in service may have momentous consequences. The heat treating of bolts to obtain strength and to resist high pressures and high temperatures has been an inevitable development to meet modern requirements. The choice of the steel going into the product is, of course, as important as the process of heat treating.

In considering the steps which have been taken to improve the quality of bolts and nuts, it is worth while first to outline certain of the uses to which these products are put in modern industry.

Logically enough, the first demand for heat-treated bolts came from the railroad field, where track bolts are subjected to a great deal of heavy use and abuse. Sagging roadbeds causing undue strain at joints, the continuous daily pounding, and the strain in drawing nuts up tight on the splice bars were common causes of failure, and such failure was always potentially a serious matter. The higher speeds and heavier wheel loads have brought ever higher requirements, until now virtually all track bolts are heat treated.

Another commercial demand of the day is for bolts that will stand high pressures. In power plant practice there are boilers designed to operate at 1400 lb., and there is good reason to anticipate that pressures as high as 2000 lb. may become commonplace in the very near future. In Europe, a boiler in an experimental installation is being operated at 3200 lb. pressure.

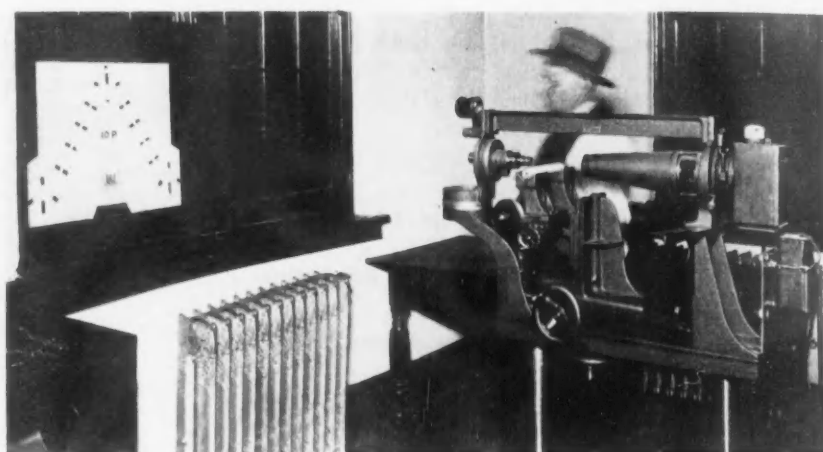
Modern cracking processes used by the oil refineries also develop not only high pressures but high operating temperatures. At present the commercial aim is for materials that will stand up satisfactorily at a temperature of 1000 deg. F. Already steel compositions are available that are serviceable at 2100 deg. F. under certain conditions.

In the chemical field the quality of resistance to corrosive action is also particularly important, and in any field where there is high temperature, corrosive action is a factor. For example, sulphur gases encountered in combustion chambers require the use of high temperature, high pressure steels which have the additional quality of being unaffected by sulphur gas.

Another point which must be watched in steels used for high tem-

perature purposes is the factor of "creep." Steels submitted to stresses at high temperatures continue to expand beyond the initial elastic extension which occurs when load is applied. This slow and continuous extension increases with the stress and temperature to which the material is

It is evident from these statements that the problem of furnishing bolts suitable for any given purpose is usually much greater than that of specifying a heat treatment and then seeing that the methods of production are such that the product will uniformly meet the requirements of the



Thread comparing machine, Lebanon plant.

subjected. The permissible amount of "creep" is a variable that is governed by the purpose for which the material is being used. In a high-pressure steam line, for example, the allowable "creep" would be small, whereas an extension of 2 to 3 per cent in ten years might introduce no element of danger in the case of a pressure vessel.

Necessary Characteristics of Bolts Summarized

The required characteristics of bolts in modern usage may then be summarized as follows:

1. Track and certain other bolts; great strength at normal temperatures.
2. For high-pressure purposes:
 - a. Material must maintain strength and continuously at high temperatures.
 - b. The coefficient of expansion should be low.
 - c. "Creep" must be tested and allowed for.
 - d. Corrosion-resistance is important.
 - e. Greater ductility is required than for normal uses.
 - f. Resistance to abrasive action is a factor in certain classes of work.
 - g. Ability to withstand effects of shock and fatigue.

specifications. Tensile strength, often quoted as a basis of comparison, does not of itself tell the whole story, for ductility and other properties must be considered.

Elaborate Equipment Required

These diverse demands and exacting specifications of modern industry have called for elaborate equipment on the part of the manufacturer. In the Lebanon (Pa.) plant of the Bethlehem Steel Co. the heat-treating department for bolts and nuts contains three automatic-type electric heat-treating furnaces, each capable of handling 2000 lb. an hour, and two gas-fired furnaces with a capacity of 1200 lb. an hour each. Quenching tanks, circulating and cooling pumps, conveyors and other auxiliaries complete the main layout. In addition, there have recently been installed two electric furnaces for drawing.

Method of Handling

Automatic - type electric furnaces are used for large-scale production orders, while the gas-fired furnaces are for miscellaneous lots which, however, need individual treatment. Temperatures are controlled in the furnace for heating, for quenching and

also in the drawing furnace by sets of thermocouples in each.

The hearth plate, which moves in and out automatically, has grooves which keep the bolts separated for more uniform heating. There are from 24 to 36 of these grooves, depending upon the size of bolts. Bolts are laid in grooves with the head facing out. As the hearth plate moves in, the heads of individual bolts pass under hinged fingers, which lift to permit the entrance of the bolts, but prevent their return when the hearth plate moves back to the starting position. The bolts thus work gradually forward as other bolts are pushed in behind them until they finally drop one by one into the quenching bath. This gives each bolt an individual quench.

Oil Used for Quenching

Oil is more commonly used than water as a quenching medium in this operation. An electric agitating pump operates a water cooler for the purpose of keeping the bath temperature constant. The time in the quenching bath is governed by the use of three-speed conveyor chains which give a considerable range of control.

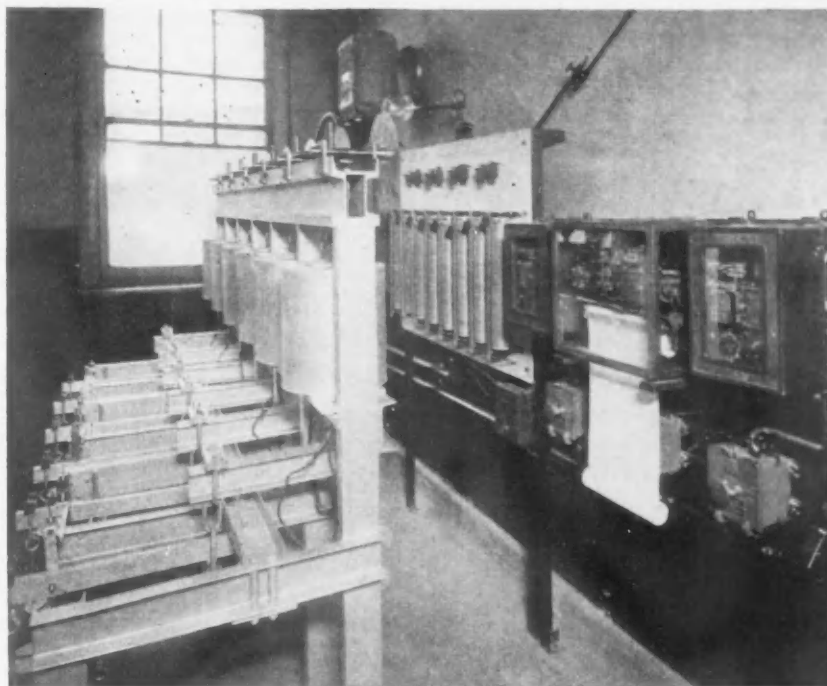
Except for the narrow slit at the front of the furnace, everything is inclosed from that point on, so that the bolts are out of contact with the air from the time they enter the furnace until they pass out into the quenching medium. This reduces the probability of scaling or oxidation.

Adjacent to the heat treating plant is a checking laboratory, which takes frequent samples and tests them for the necessary strength and properties, in accordance with the specifications and type of work on which they are to be used. The nuts for the bolts are, of course, similarly manufactured and tested. Two classes of nuts are made to show Brinell hardness of from 120 to 200 and from 225 to 350 respectively. The strength developed on stripping tests will range from 130,000 to 180,000 lb. per sq. in.

Making and Treating of Special Steels

Back of the actual manufacture and heat treating of the bolts is, of course, the fundamental requirement of the manufacture of steel. It is necessary for the maker of the steel to know the uses to which the finished bolts are going to be put, in order that there may be the proper composition for the particular job. For example, a low-carbon nickel-chromium composition is useful for bolts and studs where high ductility and ability to withstand shocks are desired. (See Table I.)

A low-carbon chromium composition may be used in certain conditions where resistance to corrosive action is important. A certain steel of this type is capable of heat treatment by oil hardening from 1750 deg. F. and drawing back to the desired hardness. In either the annealed or heat-treated condition it is resistant to atmospheric and water corrosion and



▲ ▲ ▲ High-temperature creep test apparatus set up in basement of main laboratory of Bethlehem plant.

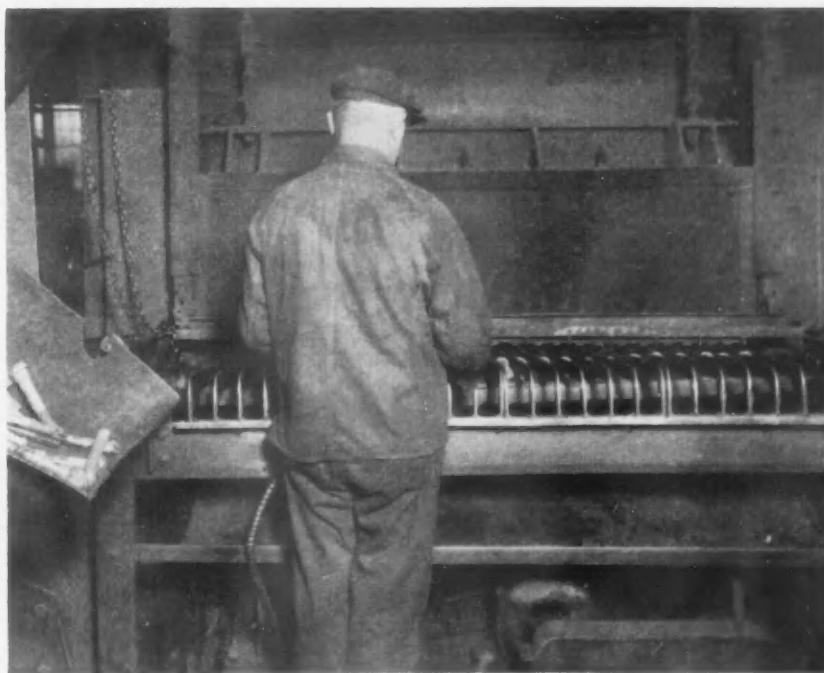
mild chemical attack. To obtain corrosion-resisting properties all scale is removed by pickling. Maximum resistance to corrosion is obtained by giving a high polish. (See Table II.)

In the field where heat resistance is important, a high-chromium steel of specific compositions may be used which will withstand temperatures up to 1800 deg. F. This is austenitic in character and will not harden appreciably by heat treatment. This steel is hardened by cold working. It resists ordinary agents of corrosion and nitric acid, and it also has high resistance to scale, at temperatures

up to 2100 deg. F. (See Table III.)

For reaction chamber bolts where strength is required up to 1000 to 1100 deg. and other purposes where high-temperature strength and high "non-creep" values are required, Bethlehem has developed a chrome-tungsten steel. (See Table IV.)

This need of various steels for various purposes again calls for modern equipment in the manufacture and testing of the metal. Some bolts are made from heat-treated bars. These are produced at the company's Lehigh mills, where the entire equipment is electrically operated, with electric



▲ ▲ ▲ Charging rack of continuous electric annealing furnace, Lebanon plant.

Table I.—Steel Having High Resistance to Fatigue and Shock

Low-carbon nickel-chromium composition useful for bolts and studs where high ductility and ability to withstand shocks are desired. Has unusually high resistance to both fatigue and shock.

Average Physical Properties

Bars quenched from 1600 deg. and drawn at 1300 deg.	
Elastic limit, lb. per sq. in.	63,000
Tensile strength, lb. per sq. in.	88,600
Elongation in 2 in., per cent.	29
Reduction in area, per cent.	79
Fatigue test, R=58 per cent.	

power being used for all heating as well as the operation of the moving parts, and with automatic control employed to insure uniform handling of material. There is a roller hearth furnace, used for heating prior to quenching or normalizing, and a quenching tank which is an integral unit with it.

The furnace itself consists of two chambers, the first the preheating chamber, and the second the one in which the material is brought up to the desired temperature for quenching or normalizing.

Through these two chambers, and extending out along the side of the quenching tank, is a continuous roller line, driven by a single electric motor. When a charge is being heated, the rolls operate eight times each minute, oscillating to the extent of 180 deg. This prevents any spot on any bar from being in contact with the supporting rolls for more than one-eighth of a minute at a time, insuring uniform heat and eliminating the possibility of cold spots. The quenched bars are then drawn in an electrically heated furnace.

Testing and Classifying the Material

The testing of the steel is as rigid as the tests applied to the finished

Table II.—Steels Resistant to the Effects of Corrosive Action, Heat and Having Other Special Properties

Low-Carbon Chromium Composition. Corrosion-Resisting

This material, because of its low-carbon content, is sometimes designated as an iron. It is capable of heat treatment by oil hardening from 1750 deg. F. and drawing back to the desired hardness. In either the annealed or heat-treated condition, it is resistant to atmospheric and water corrosion and mild chemical attack. To obtain maximum corrosion-resisting properties all scale must be removed by pickling, while articles with ground or polished surfaces will have the highest passivity to attack.

Average Physical Properties

	Max. Heat	
	Annealed	Treated
Ultimate strength, lb. per sq. in.	110,000	183,000
Yield point, lb. per sq. in.	97,000	148,000
Elongation in 2 in., per cent.	22	17
Reduction of area, per cent.	68	57
Brinell No.	229	288

bolts. The subject of "creep" is having particular attention. Laboratory tests are made for periods up to 1000 hr., covering varied temperatures and varied stresses, all of which can be selected to correspond to the type of use to which the final product is to be put. (See Table IV.)

Table III.—High-Chromium Heat-Resisting Steel

This composition, primarily a heat-resisting material, will withstand temperatures up to 1800 deg. F. It is austenitic in character and will not harden appreciably by heat treatment. Annealing is accomplished by heating to a temperature above 1750 deg. F. This steel may be hardened by cold working. It resists ordinary agents of corrosion and nitric acids and also has high resistance to scale at temperatures up to 2100 deg. F. on short-time tensile tests.

Average Physical Properties

	Annealed
Ultimate strength, lb. per sq. in.	95,000
Yield point, lb. per sq. in.	50,000
Elongation in 2 in., per cent.	18
Reduction of area, per cent.	22
Brinell No.	187

A final step in bolt and nut manufacture is the classification of inventories to provide prompt service for the buyer. At Lebanon there is a group of automatic nut tapping machines with a capacity of 1,500,000 a day. The warehouse regularly stocks some 12,000 to 18,000 tons of bolts and nuts, in 3600 distinct sizes and types.

Plaskon, a New Synthetic Molding Compound

According to a research report published by Mellon Institute of Industrial Research, Pittsburgh, a novel heat-reactive molding compound is now being produced commercially in the plant of Toledo Synthetic Products, Inc., Toledo, Ohio. This new urea-base compound, called "Plaskon," was evolved at Mellon Institute under a series of industrial fellowships sustained by the Toledo Scale Co. Copies of the report may be obtained by interested persons upon direct request to the institute.

"Plaskon" molding compound is said to be easily preformed, and it is pointed out that this property, in conjunction with the high speed of cure, makes possible rapid low-cost mass fabrication by the molder. Fabricated "Plaskon" is described as unexcelled in color possibilities, combining bright colors with a hard, lustrous surface. Its base shade is one of neutral translucency, permitting pigmentation to give all colors of any intensity, either opaque or translucent. Obviously, as indicated in the report, infinite variations in mottled or striated effects are possible.

The mechanical and electrical properties of "Plaskon" are said to be ex-

Table IV.—Tables Showing Physical Properties of Certain Modern Special-Purpose Bolt Steels

Steels for Use at Elevated Temperatures
Chrome-Tungsten Steel for Use at Temperatures up to 1000 Deg. F.

Physical properties at room temperature

	Lb. per Sq. in.
Minimum elastic limit	210,000
Average	220,000
Elongation in 2 in.	Per Cent
Minimum	18
Average	21
	Lb. per Sq. in.
Minimum tensile strength	120,000
Average	132,000
Reduction of area	Per Cent
Minimum	55
Average	61

Physical properties at high temperatures. Quenched in oil and drawn at 1150 deg. F. Held at testing temperature 30 min. before pulling

	Lb. per Sq. in.
E.L. at 800 deg. F.	110,000
T.S. at 800 deg. F.	120,000
E.L. at 1000 deg. F.	80,000
T.S. at 1000 deg. F.	100,000
E.L. at 1200 deg. F.	35,000
T.S. at 1200 deg. F.	60,000
E.L. at 900 deg. F.	100,000
T.S. at 900 deg. F.	110,000
E.L. at 1100 deg. F.	60,000
T.S. at 1100 deg. F.	85,000

Coefficient of linear expansion

Range 100 to 500 deg. F.	7.5x10 ⁻⁶
Range 500 to 900 deg. F.	7.7x10 ⁻⁶

Creep tests for 1000 hr. duration in inches per 2 in. gage length; temperature 1000 deg. F., load in lb. per sq. in.

12,500	0.00504
12,000	0.00236
11,800	No creep
11,000	No creep

cellent; they are summarized as follows:

Specific gravity, 1.43; modulus of rupture, 10,000 to 14,000 lb. per sq. in.; tensile strength, 4000 to 6000 lb. per sq. in.; compressive strength, 25,000 to 30,000 lb. per sq. in.; impact strength (Sharpe), 0.7 to 1.2 ft. lb.; dielectric constant (25 deg. C.), 5 to 6; dielectric strength (puncture), 300 to 400 volts per mil.; water absorption (20 deg. C., 1/4-in. section), 0.07 to 0.66 per cent in 24 hr.; resistance to solvents—unaffected by alcohol, acetone, oil, or other common solvents; resistance to acids—moderately resistant to cold dilute acids; not resistant to hot or concentrated acids; resistance to alkalies—quite resistant to cold dilute alkalies; also resists hot, very dilute alkalies, such as soap, borax, cleaners, etc.; hardness (Mohr scale), 3.0 to 3.5; hardness (sclerometer), 80 to 95; workability—can be machined, bored, resurfaced, and polished.

Franklin Institute, Philadelphia, will present a series of eight lectures during the remainder of 1931. Included in the schedule is a lecture on "The Status of Chromium," to be given on Nov. 5 by William Blum, chemist, Bureau of Standards, Washington. Specific information regarding the lectures may be obtained from Howard McClenahan, secretary of the institute.

New Production Machine for Honing Motor Blocks

A PRODUCTION of approximately 100 four to eight-cylinder motor blocks an hour is claimed for the honing machine illustrated, which is designed to provide cylinder accuracies of 0.0005 in. on work reamed within 0.0015 to 0.003 in. of size. Designated as model No. 214, this multiple cylinder, all-gear reciprocating spindle machine has been placed on the market by the Barnes Drill Co., Rockford, Ill.

The spindles are reciprocated hydraulically, power being obtained from an Oilgear unit mounted in the

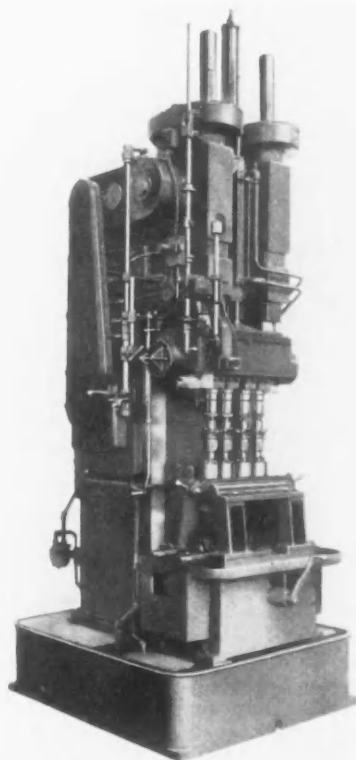
in length. Using honing stones 4 in. long, cylinders as long as 18 in. can be honed with an overrun of 1 in. at each end.

A special feature is the control lever which, when pulled forward, simultaneously engages the multiple-disk driving clutch and opens the hydraulic valve, thus starting both rotary and reciprocating motions. Backward movement of the lever stops the machine. A latch on the lever provides hand control of the vertical travel of the spindle without engaging the clutch, thus the spindle may be brought to or lifted from the work without rotation; it is essential that spindles should not revolve when hones are collapsed, unless full automatic hones are used.

For use with automatic-type hones, there is an electrically controlled automatic stroke-counting device. This can be set for any predetermined number of strokes, and more or less strokes than the setting can be obtained by means of a push-button control. Aluminum, fixed-center multiple heads are made interchangeable so that the same machine can be used for honing four, six, and eight-cylinder blocks. Adjustable-type heads can be supplied also.

Coolant delivery to the work from a reservoir in the base is under automatic control, flowing only when the head is advanced to the honing position. Laden coolant is pumped through a filter in the column before returning to the reservoir.

Specifications include: distance from center of spindle to face of column, 12 1/4 in.; maximum distance from top of base to nose of spindle, 50 1/4 in., minimum, 34 1/4 in.; diameter of spindle sleeve, 5 in.; diameter of six-splined spindle, driving end, 2 in.; taper of spindle, No. 4 Morse; reciprocating speed, 0 to 60 ft. per min.; recommended peripheral spindle speed, 200 to 250 ft. per min. Overall height is 11 ft. 11 in.; the machine weighs 10,000 lb., net with motor and starter.



base. A 1200-r.p.m. 20 to 25-hp. motor provides a constant speed of spindle rotation through helical spur gearing. There are two six-splined main spindles, each driving one-half of the auxiliary spindles on the multiple head. All power shafts are mounted on ball bearings.

Vertical travel up to 16 in. is permitted by the hydraulic cylinder mounted between the spindle housings. The piston is attached to the auxiliary head on the center line of the spindles, midway between them. Another patented feature is the air cylinder used for counterbalancing. This operates directly on the main air line. Stops permit adjustment of the stroke up to 16 in. and a skip stop is provided for raising the spindle to extreme position, thus removing hones from work in cylinders 10 in. or less

molded and vulcanized under 2000 lb. pressure. Widths obtainable range from 1 1/4 to 12 in., in 1/4-in. steps to 5 in. and in 1/2-in. steps in the greater widths. Thickness ranges from 5/32 to 1 in.

Graduates Micrometer Collar Bevels

AN improved machine for rolling graduations and figures on beveled micrometer collars has been introduced by the Noble & Westbrook Mfg. Co., East Hartford, Conn. Heavier than the company's former models, it is intended to make unnecessary the hand stamping of figures and the cutting of one graduation line at a time.

The marking die is carried on a spindle rotated through spiral gears by means of a hand crank. A separate spindle for holding the collar to be marked is set at the proper angle to bring the bevels of marking die and micrometer collar into contact. A U-shaped washer holds the collar on the arbor during the marking operation. Collar and marking die are geared together.



Pressure is applied through a cam inclosed in the base of the machine and operated by means of a foot treadle. To graduate and number a complete collar, it is only necessary to place the collar on the machine, apply pressure and turn the handle two or three times, depending on the depth of mark wanted. Collars of various sizes can be marked, providing they have the same bevel angle. The machine weighs approximately 300 lb., requires a 20 x 15-in. floor space.

Asbestos Brake Lining for Industrial Use

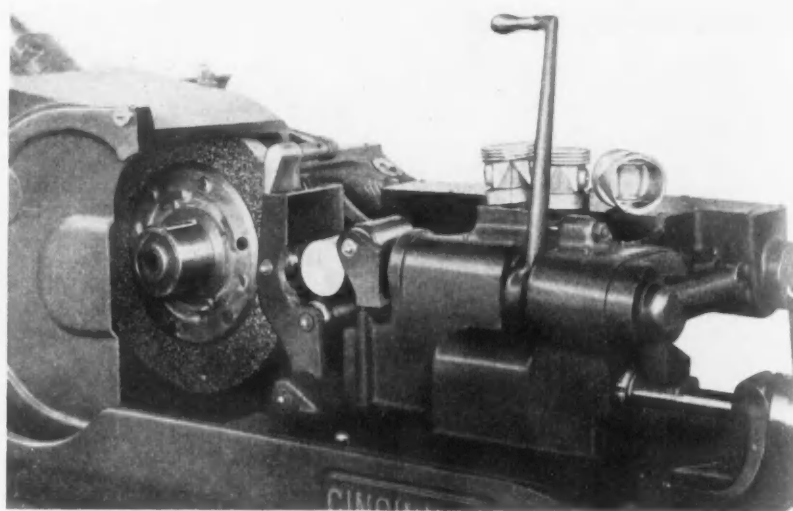
NEW brake lining of the folded and molded type for industrial machines is being marketed by the Garlock Packing Co., Palmyra, N. Y. Designated as Garlock 701, it is said to give long service under severe conditions such as encountered in oil fields, sugar refineries, steel mills, mines, etc.

The lining is made of high quality asbestos cloth impregnated with a special rubber compound. It is folded,

Piston Relief Finishing by New Method

A MODIFIED centerless grinder for finishing four reliefs on automobile pistons at a fast production rate has been developed by Cincinnati Grinders, Inc., Cincinnati. With a 0.003 in. stock removal, five pistons a minute can be relieved. Besides piston relief finishing, this grinding method can be applied to a large variety of cam shaped work.

A special work-holding and driving unit replaces the regulating wheel housing and upper and lower slides of the standard No. 2 centerless grinder. Drive to this special unit is from the regular feed box. The piston is placed on a mandrel and rotated by a floating driver. Downward movement of the operating lever engages a clutch which transmits drive to the work. The piston is supported by three sets of rollers and, as the operating lever is brought down, the upper roll at the right brings the work forward to its pivoting support and



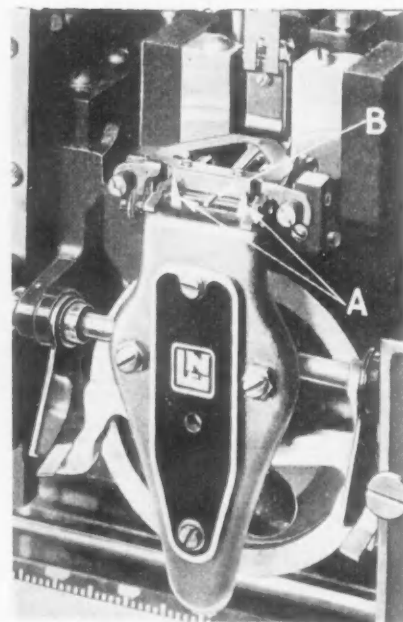
exerts the proper pressure on the work for grinding. A cam, which provides an oscillating movement to the work for grinding the relief portions, is also actuated by the downward lever movement. Work rotation is timed with

the cam so that the piston is relieved correctly. After reliefs are ground, the operating lever is raised, thus stopping the cam-controlled work oscillation and disengaging the driving clutch.

New Self-Standardizing Potentiometer Pyrometer

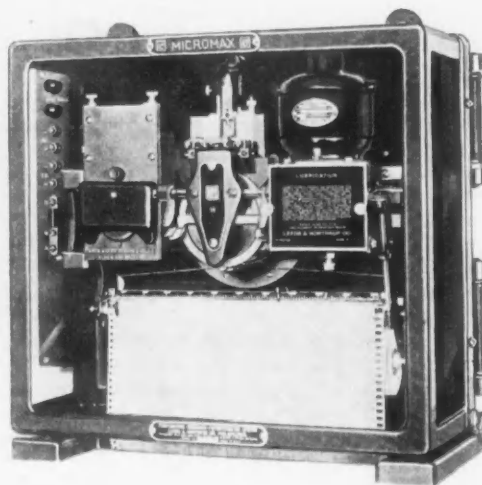
INCREASED sensitivity, faster operation and automatic standardization are features of the "Micromax" potentiometer pyrometer brought out by the Leeds & Northrup Co., Philadelphia. Former models made by this company can be equipped with the improvements which include the automatic balancing device shown in the close-up illustration and also a mechanism for standardizing the instrument automatically.

The balancing unit operates by means of scissor levers, marked A in the detail view, where they are shown in the open position. These



levers close without clearance upon the galvanometer pointer B, and are designed to record pointer deflections as small as 0.001 in. The recording pen can step across the entire 9 7/8-in. width of the calibrated chart in less than 22 sec., the size of each step being closely related to the extent of pointer deflection. The pen is driven through a simple and direct non-slip clutch that is automatically prevented from attempting to move the pen beyond either end of the scale.

Automatic checking of the potentiometer circuit every 45 min. or less is provided by the new standardizing mechanism. In addition, this device permits standardization of the circuit at will, as after changing a thermocouple, without waiting for the rest of the 45-min. cycle. It is described as giving a much closer adjustment than can be obtained by hand; the machine itself assures potentiometer accuracy.



Developments in Söderberg Electrodes

ELECTRIC furnace engineers originally objected to the round cross-section Söderberg electrode, said M. Sem, American representative of the Söderberg Electrode Process, Buffalo, N. Y., in a paper, "The Söderberg Electrode, Oblong Electrodes and other New Developments," before the 60th general meeting of the Electro-Chemical Society in Salt Lake City, Utah, Sept. 7, 1931. They were convinced that oblong or rectangular electrodes were essential for efficient furnace operation, because they produce a larger active hearth, and the gases evolved during the furnace operation are more evenly distributed through the charge.

However, the round electrodes are often to be preferred on account of certain electrical features and advantages. In general there appears to be little or no difference in economy between the oblong and the round—under proper conditions.

The first oblong cross-section Söderberg electrode was put into operation in 1921. Since then oblong Söderbergs have been used successfully in ferroalloy and other furnaces. During recent years the lowering of the Söderberg into the furnace has been made continuous and automatic.

Another recent improvement is the "wisdom ribbon," a steel ribbon which will stop the electrode when

it has slipped far enough. The dust shield around the upper part of the electrode allows a close temperature control of the baking operation. A new binder or paste melts and cements the particles together without ramming. New flexible cables are used which are water cooled, having a central metal hose through which the water is circulated. At the same time these cables carry the water to the electrode holders. The current-carrying capacity of these cables is more than seven times that of the ordinary cables.

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MATERIAL collectors reclaim waste; they are easily removed for cleaning. A fireproof ventilating unit provides safe operation.

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Small Parts Air-Sprayed by Automatic Machine

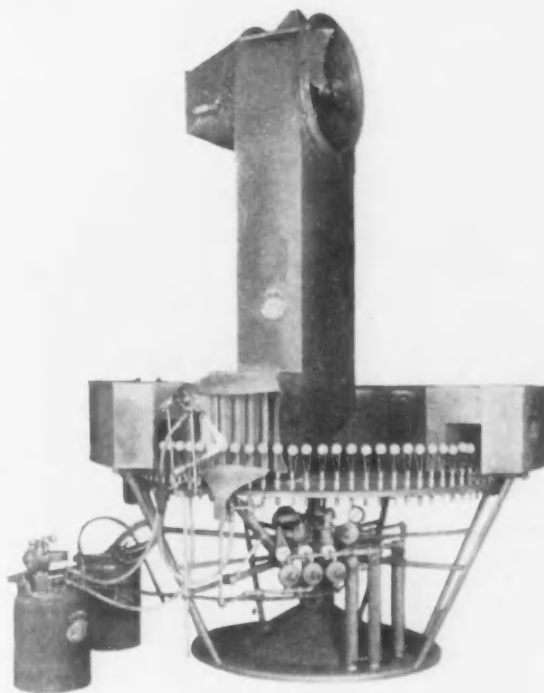
NINETY-SPINDLE automatic air-coating and drying machines that require from 20 to 30 cu. ft. of free air a min. at pressures ranging from 5 to 70 lb. per sq. in. are being marketed by Paasche Airbrush Co., 1909 Diversey Parkway, Chicago. These units are of electrically-welded all steel construction. Drive is by a flexible air-motor with self-aligning ball-bearings.

Adjustable, removable spindles with cam rollers and gears adapt the machines to work of various sizes and shapes. Water and oil separators and regulators provide clean, dry air as well as regulation to desired low

or high air pressure. Automatically air-operated convertible air-brushes in desired numbers for covering the work completely are quickly adjusted to give fine line or broad fan spray. All parts are interchangeable and completely inclosed; fluids will stand in the gun for months without gumming or clogging.

A gear spacer, designed to prevent stalling, is provided. Automatic off

and on air controls for the air-brushes can be adjusted to give the proper thickness of coat. Low or high temperature can be obtained in the cylindrical drying tunnel which is electrically heated and heavily insulated. The capacity at table speed of 1 r.p.m. is 90 pieces with 1-min. drying time; at a speed of 2 r.p.m. it is 180 pieces with ½-min. drying time.



Fittings for Welded Pipe Connections

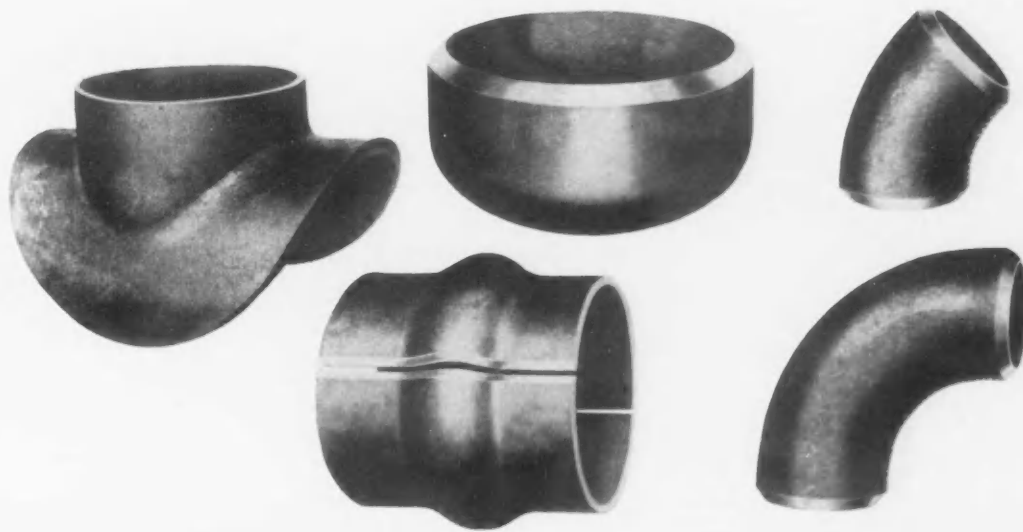
VARIOUS pipe fittings designed for attachment by welding are being put out by the Midwest Piping & Supply Co., 1450 South Second Street, St. Louis. Some of these are illus-

trated herewith. They include a 90-deg. ell, a 45-deg. ell, a head, a saddle, and a two-part sleeve.

These pieces are designed to take the place of the customary screwed fittings. The sleeve serves to cover the weld where two pipes have been welded together end to end. The head corresponds with the familiar cap for closing the end of a pipe.

Another use for the sleeve, in addition to relieving a butt-weld of bending stress, might be to fit it over a defect in a section of pipe in place, and thus form a patch.

These fittings are reported to have been subjected to a hydrostatic test pressure one-fourth greater than the mill test of the corresponding pipe.



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TYPICAL fittings for welded pipe connections; beveled ends facilitate the welding operation.

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Buick Plant Holds Foremen Accountable for Safety Work

Accident Prevention Efforts Have Greatly Decreased Frequency and Severity, Safety Congress Is Told

AS only 10 to 15 per cent of all accidents can be eliminated by mechanical means, it has been decided at the Flint, Mich., plant of the Buick Motor Co. to direct efforts of accident prevention mainly against the 85 per cent to 90 per cent class. A résumé of this plan was given by S. Morgan, director of education at the Flint plant, in an address before the twentieth annual Safety Congress recently held at Chicago. The efforts call for education of the individual to see that he performs his work in the proper and safe manner. It was said that this can be most easily accomplished through the instruction of the foreman, because he should know the hazards of methods of operation of machines and equipment under his jurisdiction. If the foreman will impart this knowledge to the men and then be sure that they are following his instructions, he can materially reduce a large percentage of all accidents.

Foremen at this Buick plant have been instrumental in reducing the frequency rate, or number of accidents per million hours work, 70 per cent. In like manner they have reduced the severity rate, the number of days lost per thousand hours worked, 50 per cent. In September, 1930, the responsibility for accident prevention was placed more definitely on the individual foreman. As a result, a further decrease in accident rate has been noticed. Comparing the nine months from September, 1930, to May, 1931, with a similar nine months from September, 1929, to May, 1930, the frequency rate has dropped from 13.71 to 10.92 accidents per million hours worked, while the severity rate has dropped from 0.98 to 0.91 per thousand hours worked.

Foremen Held Accountable

Every foreman is held strictly accountable for the condition of his department. It is his job to see that all safety devices and equipment are in proper condition. It is also his job to know that his men are properly equipped, according to the standards recommended by the safety division. In this sense he is really a representative of the safety engineer and is responsible for the men's safety in addition to his own duties. Supervisors periodically inspect the plant. Rotation of these men injects new blood and is productive of new ideas as their work progresses. Copies of their recommendations are sent to the factory manager, the foreman and the safety engineer, and when the foreman has

completed the work he in turn sends a memorandum to the same executive, stating that the request has been complied with.

Safety is again brought to the foreman's attention through an executive training program. This course is carried on by the conference method, where the foreman has an opportunity to bring his problems up for study.

Machine Inspection Necessary

Discussion during the Safety Congress brought to light the suggestion that a part will not loosen and fall from a machine in a few seconds. After a part has become loose, it may be a matter of hours, days or even weeks before it will fall and be the potential source of an injury. In most cases thorough inspection of the machine would have resulted in detection and remedy of the hazard. In one plant the practice has been adopted of having the machine operator thoroughly oil and inspect the machine as his first duty at the beginning of each day. He is not permitted to let a helper do this work for him. The theory of this is that he will detect hazards and report them so that they can be remedied before a serious accident results.

Bethlehem-Sheet & Tube Merger Called Off

A merger of the Youngstown Sheet & Tube Co. with the Bethlehem Steel Corp., will not take place, according to an announcement made on Oct. 15 by President E. G. Grace of Bethlehem. Mr. Grace stated that "due to changed conditions it is deemed impracticable to carry out the contract made in March, 1930, for the merging of Bethlehem and Youngstown and that Bethlehem had exercised its option and canceled the contract."

The contract has been extended from time to time by agreement of the parties in the hope, as Mr. Grace explained it, "that conditions would justify the consummation of what both believed to be a sound undertaking."

Frank Purnell, president of the Youngstown Sheet & Tube Co., made the following announcement:

"The directors of the Youngstown Sheet & Tube Co. naturally regret that a plan which they believed was, and still would be, constructive for both companies, and for the general situation, could not be carried out.

Another plan suggested was that machine inspection should be carried out on a very definite plan and at stated intervals by men especially skilled in this work. A plan of this kind is productive, not alone as a safety first measure, but it also will result in the detection of machine defects which can usually be remedied without serious loss of machine productive hours. This plan also has the advantage that it can be included in the budget and its cost is known.

The following officers were elected by the National Safety Council: C. W. Bergquist, Chicago, reelected president; W. H. Cameron, who opened the first offices of the council in Chicago 18 years ago, was reelected managing director; Will Cooper, mechanical superintendent, Stevens Hotel, Chicago, was named treasurer.

Nine vice-presidents were chosen as follows: For finance, J. I. Banash, consulting engineer, Chicago; for industrial safety, Arthur M. Todo, Texas Co., New York; for public safety, Edward Dana, general manager, Boston Elevated Railway Co., Boston; for business administration, G. T. Hellmuth, general claims attorney, Chicago, North Shore & Milwaukee Railroad Co., Chicago; for territorial councils, John E. Long, superintendent of safety, Delaware & Hudson Railroad, Albany, N. Y.; for membership, Howard B. Fonda, Burroughs, Wellcome & Co., Inc., New York; for engineering, J. E. Culliney, Bethlehem Steel Corp., Bethlehem, Pa.; for education, Albert W. Whitney, associate general manager, National Bureau of Casualty & Surety Underwriters, New York; for health, Dr. C. E. A. Winslow, Yale Medical School, New Haven.

"In view of the cancellation of the contract by Bethlehem Steel, the board of directors of Youngstown Sheet & Tube ordered dividends, hitherto withheld, to be paid as soon as the dissenting shareholders can establish their rights to receive the same. The amount involved for immediate disbursement is approximately \$1,700,000. This sum has been set aside by the Youngstown Sheet & Tube Co. as a special fund and is in hand in available cash."

No statement was to be had as to whether new negotiations will be undertaken for the merger of the two companies on a different basis.

Doehler and Bohn Exchange Departments

The Doehler Die Casting Co., New York, and the Bohn Aluminum & Bronze Corp., Detroit, have announced an arrangement by which the Doehler company has taken over the Bohn die casting division in exchange for the former's permanent mold department. Closer cooperation between the two companies will result from this transaction.

Canada Hopes to Develop a Self-Contained Steel Industry

Belief in Dominion Is That Country's Natural Advantages Should Be More Fully Utilized

WASHINGTON, Oct. 20.—Efforts of Canada to build up a self-contained iron and steel industry are set forth in a report by Consul Howard A. Bowman concerning the development of the Algoma Steel Corp., Sault Ste. Marie, Ont. The present investment in the plant is placed at \$40,000,000, with normal shipments of 500,000 to 600,000 tons annually. Mr. Bowman points out, however, that as the steel industry is the mainstay in the industrial life of the district where it is located, its spasmodic operation in the past has proved disconcerting to the personnel of the plant, which has been modernized with up-to-date equipment, ore docks, rail service, etc.

Operations at present are declared to be negligible, with only about 800 men engaged in part time work. Capacity operations require 2800 workmen. Prospects for the immediate future are said to be anything but promising. In the past about one-third of the tonnage production has consisted of railroad material, but general economic conditions have forced the railroads to curtail purchases.

Mr. Bowman states, however, that with the advent of a higher tariff on steel products, the users of steel products in central and western Canada, who have previously found it cheaper to purchase steel for their needs in the United States, may represent a future market for expansion.

Canada Aims at Self-Sufficiency

"There has been developing in recent years an intense feeling of the necessity of Canadian industry, and particularly the basic iron and steel industry, becoming more complete self-conscious and self-sufficient with respect to the country's needs for manufactured commodities," Mr. Bowman reports. "This sentiment constitutes one of the more important factors in public opinion in Canada today and has taken more tangible form than ever before in the policy of the administration. Industrial nationalism is being encouraged by greater tariff protection for existing industry, by a tariff schedule designed to encourage the manufacture of commodities which have previously been imported, and by a strenuous campaign to promote the use of articles of Canadian manufacture to the exclusion of those of foreign manufacture."

Leaders of this movement are described as being impressed by the fact that the United States has, in a comparatively brief period, built up

the greatest industrial business in the world and that the major part of the business is tributary to the Great Lakes. This tremendous development is said to have so impressed the Canadians that they are anxious to get under way with the utilization of their own resources. They are represented as feeling that the industrial areas adjacent to the Lakes have been made possible by cheap iron ore, cheap copper, and cheap transportation, and that it is high time Canada began to profit by these natural advantages.

Engineers to Help Solve Depression Ills

In a concerted effort to help solve the depression and unemployment problems, the American Engineering Council has issued a call for the mobilization of more than 100,000 engineers affiliated with engineering and allied technical societies in the United States. F. J. Chesterman, vice-president, Bell Telephone Co. of Pennsylvania, is chairman of a national committee which will direct the engineering effort to be carried out in detail by committees to be named in every State.

The aim of the committees will be to promote emergency measures and to develop sound, permanent employment policies throughout American industry. The council will work in co-operation with the relief organization set up by President Hoover under the chairmanship of Walter S. Gifford.

Active Technical Program for Institute of Metals

The Institute of Metals (British) has just issued its full program of meetings for the winter session both of the parent institute and of its six local sections. The latter are seen to be centered in Birmingham, Glasgow, London, Newcastle-on-Tyne, Sheffield and Swansea. In each of these industrial centers there will be given from October to March a series of lectures dealing particularly with local metallurgical and engineering problems. In all, over 40 meetings will be held.

Among the subjects dealt with are mechanical testing of metals; the casting of "tough-pitch" copper; electric welding of non-ferrous alloys; the extrusion of metals; recent advances in rolling plant; X-ray examination of

alloys; protective coatings on metals; die casting; defects in non-ferrous castings, refining of copper, new alloys in the brass foundry; notes on condenser tubes and their packing; aluminum-silicon alloys, gases in metals; engineering silver solders; stresses in metals; the technique of enameling; the use of cast iron in the non-ferrous industry, and some causes of unsoundness in non-ferrous alloys.

Next year's autumn meeting, it is announced, will take place during a visit to the United States and Canada from Sept. 3 to Oct. 8. Copies of the program can be obtained on application to the secretary, G. Shaw Scott, 36 Victoria Street, Westminster, London, S. W. 1.

International-Stacey Buys Stacey Mfg. Co.

The International-Stacey Corp., Columbus, Ohio, has purchased the Stacey Mfg. Co., Cincinnati, one of the oldest and largest designers and fabricators of gasholders and other high-pressure tankage. The newly acquired company will be operated in conjunction with the Stacey Brothers Gas Construction Co., Cincinnati, recently taken over by the International corporation, and together they will form a group to be known as the Stacey Gas Construction Division of International-Stacey Corp.

The Cincinnati group, which will be directed from the executive offices in Columbus, will be headed by Col. Carmi Thompson, president; A. A. Ranshaw, vice-president; H. M. Runkle, secretary-treasurer, and E. J. Baechle, assistant secretary-treasurer.

Some Construction Gains Reported by Dodge

Exceptions to the rule of a general loss of 26 per cent in third quarter construction contracts for the 37 States east of the Rockies from the third quarter of 1930 are found in certain construction class gains by F. W. Dodge Corp. Among these gains is a 29 per cent advance in engineering in upstate New York, 6 per cent in the same class in the Middle Atlantic district; 34 per cent in non-residential building in the Chicago territory; 3 per cent in non-residential and 248 per cent in engineering in the New Orleans district; and 14 per cent in engineering in Texas.

Two of the thirteen Dodge territories east of the Rockies showed gains for this third quarter as contrasted with the 1930 period.

During September non-residential building was the most important major construction class, forming \$112,417,500 of the entire \$252,109,700 total for the month. Residential building amounted to \$54,552,800; and public works and utilities to \$85,139,400.

GRAY IRON INSTITUTE REVIEWS YEAR OF ACCOMPLISHMENT



MUCH valuable research work, as well as important activities in other directions, marked the accomplishments of the Gray Iron Institute during the past year. This was brought out at the fourth annual meeting held at the West Baden Springs Hotel, West Baden Springs, Ind., Oct. 15 and 16.

The plan of holding group meetings of foundries in various districts was more extensively followed during the year than previously and brought results of much value to the individual members, as was indicated by reports. In these meetings foundrymen discuss costs and other problems applying to their particular localities and the meetings have done much to bring about cooperative effort.

A director of research was appointed by the institute a year ago. Since that time Oliver Smalley, the research director, has been carrying out a broad program of technical research activities and the preparation of standard practices and standard specifications, some of which were detailed in his reports. Placing the gray iron industry on a higher plane, improving the qualities of gray iron castings, having standard specifications for iron for certain uses and increasing the field of gray iron castings are some of the things the institute expects to accomplish through its research activities. Further broadening of its work is one of the objectives of the institute.

No Loss of Membership

Satisfaction was found in the report on membership, which showed that in spite of the unfavorable business situation with respect to gray iron foundries there was no falling off in membership the past year, the number of members being exactly the same as a year ago. The registered attendance at the meeting was about 65, or somewhat less than at the 1930 meeting.

The sessions were presided over by the president, B. H. Johnson, Florence Pipe Foundry & Machine Co., Florence, N. J., who in his annual report stated that the institute had accomplished great work in its three and one-half years of existence and that the past year had been one of prog-

ress. The past year, he said, was the first one during which each of the major activities was carried out under a definitely planned program and under an approved budget of expense. Much has been done, a good deal of which is tangible, and he believed a great deal more has been accomplished of which there is not direct evidence of accomplishment. The work of the cost department, he declared, has awakened non-member foundries to see the need of a real cost system. Conditions growing out of the period of depression must receive the serious attention of the members. Plans suggested for the amelioration of causes of such conditions, such as the Swope plan for compulsory cooperation, show that there is a strong trend of thought along these lines and it is the duty of the institute to watch developments of such ideas and use its influence in the right direction.

Trade Association a Stabilizing Influence

More and more the trade association is being recognized as a means through which the industry it represents can and will be stabilized, he declared. Prominent leaders in their discussions have made reference to the important part trade associations must take in the readjustment and development that will eventually follow the worldwide depression.

Activities of the institute during the year were reviewed by the manager, Arthur J. Tuscany, in his annual report. He said that the creation of a technical department, broadening of cost work and increased merchandising activities were carried forward during the year with great value to the gray iron industry. That the institute could report such splendid progress and point to its greatest development and broadest service during a time when the battle for profits was keenest indicated that the assistance of the institute is particularly necessary during times of stress.

There must be a steady influx of new members, he said, if progress is to be maintained. The information made available through the monthly trade report, periodical wage reports and other regular activities has been of considerable assistance to members. In several cases manufacturing facilities have been made more efficient through consolidation of existing foundries. In many other cases companies making their own castings have been induced to close their foundries and buy castings from jobbing plants.

Sixty-Two Meetings During Year

The institute conducted 62 meetings during the year on different phases of its activities. Much good was accomplished by local group

NEW OFFICERS

OFFICERS elected for the following year were: president A. E. Hageboeck, Frank Foundries Corp., Moline, Ill.; first vice-president, J. L. Carter, Sacks-Barlow Foundries, Inc., Newark, N. J., succeeding Mr. Hageboeck; second vice-president, J. H. Bruce, Bowler Foundry Co., Cleveland; treasurer, R. D. Phelps, Francis & Nygren Foundry Co., Chicago; assistant treasurer, H. C. Wilson, Cleveland Cooperative Stove Co., Cleveland. New directors for three years are: Messrs. Hageboeck and Carter and G. W. Blakesley, Security Stove & Mfg. Co., Kansas City; H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y.; R. R. Monroe, Des Moines Foundry & Machine Co., Des Moines, Iowa, and Edward B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill.



J. L. CARTE^R

meetings in different territories. Cost work in particular and technical work to a large extent have been discussed at these meetings and this work, he said, should be broadened. Much progress was made during the year in the cost program. The periodical cost reports have given members tangible information on reducing costs and measuring efficiency.

The technical bulletins, Mr. Tuszany said, have proved a valuable asset to the members. Progress is being made in the work of establishing recommended practices or specifications for different types of gray iron castings. Many members are using the institute's standard form of sales contracts and others were urged to make use of these forms. An important achievement is the development of appreciation on the part of buyers, engineers and the public of the many advantages of gray iron castings.

A good foundation, he said, has been laid for the next step in the program, which is to show the engineering possibilities of gray iron and to develop information with a view to bringing about a more general use of gray iron castings through supplying engineers and designers with tangible data on the product. Companies that are weathering the storm of the present period of depression, he said, are those that are losing no opportunity to reduce costs, improve the quality of their product, expand their markets and carry forward other activities.

A new feature in the budget is its flexibility, which permits the institute to follow the policy of living within its means, according to the report of H. S. Chafee, Builders Iron Foundry, Providence, R. I., chairman of the Finance and Budget Committee.

The institute lost 11 member companies and added 11 during the year, its membership being unchanged at 236 according to the report of the

Membership Committee, which was presented by H. P. Hubbell, Semi-Steel Casting Co., St. Louis. The Trade Information Committee, through C. B. Magrath, Greenlee Foundry Co., Chicago, chairman, recommended that the work of this committee be turned over to another committee and thought it could be handled better by the Merchandising Committee. Trade information work recently has been handled largely by the manager's office.

Standard Cost System Wins Wide Adoption

The work of the cost committee was reviewed in a report of that committee by its chairman, J. L. Carter, in a session that was devoted to cost matters. The institute's standard cost system, he said, has been adopted by over 200 of its members and has been indorsed by various other associations. The next line of endeavor will be to secure its adoption by other foundries. Fully 85 per cent of the foundries, he said, have no cost system worthy of the name. Group meetings of foundrymen attended by the institute's cost consultant have been held to explain the system. There are now 16 local cost groups in which there are 150 foundries and cost work is making progress. There is no excuse today, he said, for a foundry not to have an adequate cost system. A nucleus has been provided for effecting a saving in costs although it is too early as yet to obtain much in results.

Ignorance of costs was blamed by Mr. Carter as the reason for quoting too low prices on castings. Foundries, he said, should get their cost groups functioning properly and should attempt to educate their competitors. He urged foundry executives to give costs their personal attention and to induce competitors who disorganize the market by not knowing costs to come into a cost group. More frequent cost group meetings were urged by Mr. Hageboeck.

Need of Better Estimates of Molding Costs

A round-table discussion of rate-setting in gray iron foundries was led by William J. Grede, president, Liberty Foundry, Inc., Wauwatosa, Wis. He stressed the importance of determining the direct labor costs of making molds saying that it is unsafe to figure out other costs and then guess at molding costs. Replies to questionnaires sent out by the American Foundrymen's Association asking who fixed molding costs and how they were arrived at showed that while some foundries had some sort of system a large number were guessing at molding costs.

Members were asked whether they thought it advisable to set a molding rate on a practical basis in order to make estimates more nearly alike and to avoid the error of judgment. Some of the foundrymen in the discussion



A. E. HAGEBOECK

expressed the opinion that no time-study system is as good as judgment in setting molding rates except on production work, particularly on squeezer work. They declared that rate-setting would not be satisfactory for jobbing work. Mr. Carter thought it would be a good plan to advocate rate-setting on squeezer work and later this might be extended to jobbing work. Foundrymen, he said, should try to eliminate human errors. He thought that if foundries checked up their costs accurately this would likely be a check on foremen's estimates and that foremen would be inclined to be more careful. Mr. Grede recommended that the cost committee collaborate on this subject with a similar committee of the A. F. A.

A paper on the application of the variable budget principle to foundry management was presented by R. O. Flanders, secretary of Blue Valley Foundry Co., Kansas City, Mo., and aroused considerable interest. The paper, which was accompanied by various tables and graphs, indicated that the writer had given a great deal of study to the subject.

That many foundries had been benefited by using the institute's standard cost system was shown by extracts of letters read by Charles A. Klaus, Eastern cost consultant. Some foundrymen stated that they had found certain departments were losing money as they were being operated and had replaced their equipment. Others found from the use of the comparative cost reports that some of the work they were doing was unprofitable and others discovered that costs in certain departments were too high and succeeded in reducing these costs.

Standard Test Bars Designed

A résumé of the activity of the Technical Committee was given by H. B. Hanley, its chairman, at a technical session. The first attention was given to test bars that would suit the

needs of the foundry industry. The committee had in mind the adoption of classifications so that the buyer would get the kind of castings he needed, the elevation of standards of gray cast iron, cooperation between foundries and bringing about broader uses and new uses of cast iron. The test bar surveys have been completed and the results have been listed. The technical bulletin has been established and a complete study of the test bar needs of gray iron foundries are covered in a bulletin. Progress, he said, has been made in standard practices under the classifications of cupola practice, molding specifications and design and engineering. Four standard tensile test bars have been designed to show the strength of iron. Members have submitted 110 problems to the technical department and have been given much useful information.

Various phases of the technical work he is conducting were discussed by Mr. Smalley. These included interpretation of the technical bulletin, proposed specifications and standard practices and what they mean to the industry. The data obtained, he said, are being placed promptly in the hands of members. Studies have been made of melting, molding and core sands, design and engineering including physical problems, specifications and of other problems relating to the industry. Discussing proposed specifications, he said that tentative specifications provide for four standard test bars for tensile and transverse tests. The purpose of having standard specifications is to establish reliable practice for the gray iron industry, elevate the industry, enable foundrymen to attain efficient results, to advance the technical standards of gray iron practice and to give the foundrymen something definite to merchandise.

Standard Cupola Charging Sheet Approved

A standard cupola charging sheet and daily melting log was submitted by Mr. Smalley and formally approved. This is included in Bulletin 9, which has just been issued. It is expected that by using these sheets the members will be able to check up and improve their practice as well as their standards of control, so that they can hold to more rigid specifications and effect melting economies.

A standard list of compositions and mixtures was also submitted by Mr. Smalley and this is included in Bulletin 10, to be issued shortly. This list, he said, brings up to date a complete list of chemical compositions and mixtures. The real value of the list, he pointed out, is to enable each member to check up his practice and to guide him in the manufacture of castings with which he is not familiar. He stressed the importance of individual intuitiveness in improving castings. Three principles, he said, should be kept in mind in respect to castings. These are reliability, lightness and neatness.

Only one phase of specifications for castings for engineering purposes had been studied. This covered heat-resisting castings that are subjected to uniform heating above red heat. An exhaustive report has been made on these castings. Heat-resisting castings have been divided into three other classes, those subjected to uneven heating and cooling, those subjected to sudden heating and cooling and those that are to withstand combined heat and wear resistance.

In concluding his discussion, Mr. Smalley declared that the use of the electric furnace in the gray iron foundry will become much more general and that foundries should recognize this and be prepared for the tendency toward electric melting.

Distribution is the great problem of the age in the gray iron and other industries, declared George L. Willman, sales counsellor, Chicago, in an interesting talk on merchandising. The country, he said, has about completed the age of basic construction and now comes a greater opportunity of refinement, of perfecting details and of weeding out the unfit in industry. With the keenly competitive market, efficiency in merchandising must be increased. The day of small firms attempting to operate independently is about over. Small companies in one line must cooperate. He thought that the merchandising of gray iron castings might be helped by adopting a new name for the product, such as Gray-loj castings.

Mr. Tuscany said in concluding the session that the quicker the gray iron makers adopt a firm one-price policy the better it will be for the industry.

Stabilization Plan Favored

A resolution indicating that the institute favors the adoption of some plan for the stabilization of industry was presented and referred to the board of directors. This resolution provided that any stabilization measures adopted should not be directed by a Government department but should be handled by the industry itself through its trade association, and also that a national economic planning board consisting of a few industrial leaders be appointed by the President to act in an advisory capacity only.

A roundtable discussion on how the institute activities can help through the local groups was held after a dinner meeting Thursday. It was brought out that comparative cost reports produce a feeling of mutual confidence among members of a group. The development of the group spirit and the feeling of necessity of cooperation were among the good results ascribed to these meetings. Brief remarks were made by S. T. Johnston, former president, and C. E. Hoyt, secretary of the American Foundrymen's Association. At a luncheon Friday the stabilization of employment in industry was discussed by William J. Barrett, New York, associated with President Hoover's organization on unemployment relief.

Lavino & Co. Take Over Pig Iron Business

E. J. Lavino & Co., Philadelphia, have formed a subsidiary to be known as Rogers Brown-Lavino Co., to conduct a pig iron, coke and metal business similar to that formerly conducted by Rogers Brown & Crocker Brothers, Inc., which is now liquidating. The sales offices and principal personnel of the latter organization in Boston, New York and Philadelphia will be retained by the new company, whose headquarters will be connected with those of E. J. Lavino & Co. in the Bullitt Building, Philadelphia.

Directors will include Edwin M. Lavino, president; N. R. McLure and Harbour Mitchell, all of E. J. Lavino & Co., together with C. H. Newcomb and L. H. Miller, both of whom have been associated with Rogers Brown & Crocker Brothers, Inc., for many years. Mr. Newcomb will be vice-president in direct charge of all activities, and Mr. Miller will be vice-president in charge of the New York office. The Boston office will be under the management of C. A. Reed, who held a similar position with the old company. The new company started operations on Oct. 16.

The merging of Rogers Brown & Co. with Crocker Brothers in July, 1925, combined two interests for many years prominent in the pig iron business, the former having been established in 1880, and the latter in 1854. Prior to that merger, Rogers Brown took over Naylor & Co., and Crocker Brothers absorbed Reed, Fears & Miller.

George W. Moore Co., Chicago, and H. W. Caldwell & Son Co., a subsidiary of Link-Belt Co., have merged and will be known as the Caldwell-Moore Division, Link-Belt Co. Max H. Hurd, formerly president of the Moore company, has been made a vice-president of the Link-Belt Co. in charge of the Caldwell-Moore operations, with headquarters at 2410 West Eighteenth Street, Chicago.

Design in Industry, a monthly bulletin sponsored jointly by the Newark, N. J., Public Library and the Newark Museum, is in its second year of publication. This bulletin, which annotates current literature on industrial design, in its first year compiled 849 items from 186 periodicals covering many fields, which included art in industry, ceramics, machinery and metal work.

PROGRESS REVEALED IN RUSTLESS STEELS AND CLEANER METAL

By EDWIN F. CONE

FURTHER progress in the research work of the Metallurgical Advisory Board to the Carnegie Institute of Technology and the United States Bureau of Mines was impressively delineated at the fifth open meeting of the board in Pittsburgh, Oct. 16. Results of the past year's work were convincing to a large audience as to both the theoretical and practical value of the research program, which will conclude a five-year period at the end of this year. Renewed interest and zeal were stimulated by the announcement at the banquet in the evening that sufficient funds were promised to prosecute the work beyond the original period.

Attendance at the two sessions, morning and evening, was the largest on record. Contrasted with a registration of 68 at the first open meeting and with 347 last year, the total last week was 362. Members of the advisory board of about 25 members and six ex-officio members are all prominent metallurgists and steel officials of the Pittsburgh district.

There were two main topics on the program: The chrome-nickel-iron and the iron-manganese-carbon alloys and deoxidation of open-hearth steel with manganese-silicon alloys and the effects of inclusions in steel. Minor topics included the solubility of carbon in iron-manganese-silicon alloys, the electrolytic method for the determination of inclusions in steel, viscosity relations in the system lime-silica-fluorspar, and investigations of strong deoxidizers.

The Cr-Ni-Fe Alloys

On the subject of the rustless steels, or the chrome-nickel-iron alloys, Dr. V. N. Krivobok of the Carnegie Institute presented a progress report which supplements the one delivered a year ago (*THE IRON AGE*, Oct. 23, 1931). In his usually effective and convincing manner the author gave an abstract of his paper, which covers 40 printed pages, entitled "Further Studies on Chromium-Nickel-Iron and Related Alloys."

Dr. Krivobok this year dealt principally with the problem of decomposition of these alloys under certain conditions, a phenomenon often characterized as carbide precipitation. Such decomposition is known to be accompanied by the precipitation of a

constituent generally believed to be carbides. The author states that these precipitates are not necessarily carbides, because, in very low-carbon alloys, the precipitated constituent is without doubt magnetic chromium-nickel ferrite—dependent on the carbon content of the alloy. In fact, when these alloys are made with an extremely low carbon content, they are immune from decomposition or precipitation, he asserted. When the carbon content is increased above a certain very small amount, the decomposition process is practically independent of the carbon percentage. Hence the author contends that there is very little reason to aim at a low-carbon content in commercial alloys.

Effects of Additions of Other Metals

It was found, says Dr. Krivobok, that the additions of certain elements, such as cobalt, molybdenum, silicon and copper, prevent these changes, but do not suppress precipitation of a constituent such as carbides. Also it was shown that such precipitation has but little effect on some of the mechanical properties and resistance to corrosion in standard alkali solutions. He suggests that copper sulphate tests should be applied with intelligence.

Another important finding of the author is that changing the relative amounts of chromium and nickel does not improve the alloy as to decomposition. Resistance to decomposition of alloys with special additions is materially influenced by carbon content. The higher the carbon content, the larger must be the additions of such beneficial elements.

Importance of Heat Treatment Stressed

Heat treatment of these alloys has a potent influence previous to decomposition and is fully discussed. The original quenching temperature of the alloy exercises a very definite influence on decomposition. Dr. Krivobok stated that the alloys were studied by means of magnetic analysis, microscopic observations and corrosion tests.

Discussion

In the discussion of Dr. Krivobok's paper, J. P. Gill, chief metallurgist, Vanadium Alloys Steel Co., Latrobe, Pa., referred to the work of E. C.

Bain on evidence of the solubility of carbon in these alloys at different temperatures and the effect at temperatures under 1600 deg. of adding copper and molybdenum and perhaps other elements. He called attention to the paper at the National Metal Congress by H. D. Newell, who showed that, when the quenching temperature is such as to result in a smaller grain size, there is less tendency to precipitations. Mr. Gill stated that developments are toward the addition of other metals, such as tungsten, molybdenum and so on, some of which aid materially in improving these alloys, particularly as regards precipitation.

A new impetus for the investigation of the properties of austenite has been afforded by the advent of the chromium-nickel corrosion-resisting steels, said F. H. Allison, Jr., Crucible Steel Co. of America, New York, in the absence of Dr. John H. Mathews. Much time has been heretofore given to the ferritic alloys with a dash of austenite included. With the larger use of the 18 and 8 and other alloys, it has become necessary to get more intimately acquainted with the behavior of gamma iron in order to deal with the problems occasioned by its use.

Some Measure of Disintegration Needed

As to the present work on intercrystalline attack, there are several points to be discussed, said Mr. Allison. In the first place there should be developed a reliable index of the extent to which the attack has proceeded, capable of quantitative rather than qualitative expression as at present. Tests have been made in which the results have been observed by noting the sound of the specimen dropped on a hard surface, by noting the appearance on cold bending, by measuring the depth of intercrystalline attack on cross-section, and by measuring the depth of disintegrated material on machining.

The author has indicated that the extent of decomposition on subsequent reheating is greatly influenced by the original quenching temperature, said Mr. Allison, and there must be an important property of austenite involved in this phenomenon. The effect of time and temperature to which the alloys are reheated should

be valuable in establishing the limits of usefulness of the compositions.

Number of Particles Important

Mr. Allison then developed the proposition of an investigation of the number of particles and the increase in surface exposed, due to the effect of colloids in solid solutions and the suspension of submicroscopic particles of carbide in a solid solution of either austenite or ferrite. With a decrease in particle size there is a large increase in exposed carbide surface. It should be noted also that some colloids are known to possess an electrical discharge.

Dr. Krivobok's paper was also discussed by O. V. Green, Carpenter Steel Co., Reading, Pa.; by R. T. Mayo, American Rolling Mill Co., Middletown, Ohio; by Dr. John A. Mathews, Crucible Steel Co. of America, New York; by Dr. Beno Strauss, Krupps, Germany; by H. D. Newell, Babcock & Wilcox, Beaver Falls, Pa., and by Dr. Albert Sauveur, Harvard University, Cambridge, Mass.—all in writing but not read.

Alloys of Fe, Mn and C

A pamphlet of 45 pages was necessary to present the details of the investigations on the alloys of iron-manganese and carbon, conducted under the efficient direction of Dr. F. M. Walters, Jr., and his assistants, Cyril Wells, M. Gensamer and J. F. Eckel, all of the Carnegie Institute. The results were discussed by Prof. W. J. McCaughey, Ohio State University, and by Dr. H. C. Frary, director, research laboratories, Aluminum Co. of America.

Progress in Making Clean Steel

Very impressive and highly valuable was the clear, concise presentation by Dr. C. H. Herty, Jr., of the Bureau of Mines, of the progress of the work of himself and his associates during the past year on the investigation of the production of clean steel with which his name is so closely associated.

Dr. Herty opened his presentation with a brief review of what had been accomplished up to a year ago and then launched into his main paper, "Deoxidation of Open-Hearth Steel with Manganese-Silicon Alloys." Including his morning paper on the "Solubility of Carbon in Iron-Manganese-Silicon Deoxidizers," his presentation takes about 60 pages of type-written sheets, exclusive of many illustrations.

It is unfortunate that space does not permit here an adequate review of this splendid work. The results are not yet in printed form though it is hoped they will be. An impressive portion is that which discusses plant work, or the application on a large practical scale of his process and theories for producing clean steel with the use of manganese-silicon alloys. The plants where this work was done, largely under the direct supervision

of C. F. Christopher of Dr. Herty's staff, were those of the Jones & Laughlin Steel Corp., and the Homestead plant of the Carnegie Steel Co.

Applying the Method to High-Carbon Heats

Dr. Herty called particular attention to the results on high-carbon steels in the making of which much the same practice is followed as that used on low-carbon steels. At the Jones & Laughlin plant, the decrease in rejections was very marked and on two of the five grades of steel the chipping costs were cut down considerably—due of course to the use of manganese-silicon alloys as deoxidizers in varying amounts.

On high-carbon axle steel heats at the Homestead works, some of the results of the use of Dr. Herty's process indicated that chipping costs depended primarily on two factors: (1) The deader the steel killed and therefore the denser it is, the higher the chipping cost for a given heating temperature. Steels containing 0.07 to 0.12 per cent silicon gave a much lower chipping cost than steels with 0.15 to 0.22 per cent silicon. (2) With the denser steels the chipping cost was cut down considerably by an increase in heating temperature.

Since the report of a year ago some 55 heats of low and high-carbon steel have been made, using silico-spiegel as a deoxidizer, said Dr. Herty. In general, the steel thus made seems to be consistently cleaner when proper deoxidation practice is followed, as indicated by the difference between 2500 and 3500-lb. additions of the manganese-silicon alloy. Chipping costs are so dependent on heating that it is necessary to make a larger number of heats before definite figures can be set down.

Finally, it is felt that the theoretical steps have been essentially completed for this type of deoxidation and that all that remains is for a sufficiently large number of heats to be made in any one plant for the method to be proved. Where a few heats have been made with varying results, it has been found that there was some part of the practice which was not followed.

Approbation from Practical Operators

Two open-hearth superintendents and one engineer of tests discussed Dr. Herty's work: F. L. Toy, and E. L. Ramsey, open-hearth superintendents of the Homestead Plant, Carnegie Steel Co., and of the Wisconsin Steel Works of the International Harvester Co., Chicago, respectively, and H. J. Cutler, engineer of tests, Lackawanna Plant, Bethlehem Steel Co., Lackawanna, N. Y.:

"Never in my knowledge," said Mr. Toy, "have the quantitative effect and time factor been so thoroughly coordinated, and this mass-time effect has also been calibrated thoroughly in respect to the secondary deoxidizers or fluxing agents which flux the deoxidation products resulting from the initial addition of silicon or of man-

ganese-silicon alloys. Outstanding in this report is the example set for careful and comparative evaluation of the effect of deoxidizers on the bath." He paid a warm tribute to Dr. Herty and Mr. Christopher as associates and collaborators in the work at Homestead. Mr. Ramsey testified that Dr. Herty's work "has cleaned up many heretofore unanswerable questions, the knowledge of which is essential to the consistent production of quality steel."

Mr. Cutler asserted "that the high-carbon axle heats show conclusively that the latest developed practice yields the cleanest steel as indicated by the step down and journal tests. The final results are the matter of greatest importance. The importance of manganese to the cleansing of the steel and the fact that reduction by manganese proceeds at a slower rate would seem to indicate that the greatest quantity of manganese should be available during the entire deoxidation period. This would mean alloys with the highest permissible Mn-Si ratio and used either with no subsequent ferromanganese addition or a smaller addition in order to keep within the manganese specification of the finished steel."

Some Effects of Inclusions

Another important contribution of Dr. Herty to the day's program was a progress report on "Effects of Inclusions in Steel." This is a new work on which he has set out and, while only in its early stages, some important facts have been discovered. Some of the properties of the steel depend on the character and composition of the inclusions and it is expected that next year this work will have progressed to the stage where some valuable practical data will have been brought out. This paper was discussed by several metallurgists.

Necessity of Market Research Stressed

The day's program was brought to a close with an informal dinner at the Hotel Schenley, attended by about 135. Dr. Thomas S. Baker, president of Carnegie Institute, presided as toastmaster in his graceful and effective manner. As the chief speaker of the evening he introduced Charles F. Abbott, executive director of the American Institute of Steel Construction, Inc. Taking as his subject "Market Research in the Machine Age," Mr. Abbott impressively demonstrated the present need of the steel industry for research as to new uses for steel and gave some examples of what had been done by his organization.

Work to Continue

After the chief address of the evening, Dr. Baker called on Dr. F. N. Speller, chairman of the Metallurgical Advisory Board, who announced that he and the other present officers had been persuaded to continue for another year. He also said that assurances were ample for a continuance of the work for another year, though on perhaps a somewhat reduced scale, even though the Bureau of Mines could not participate after Dec. 31.

INDUSTRIAL ENGINEERS REVIEW MANAGEMENT PROBLEMS

WITH a widely diversified program, including such important topics as depreciation, plant maintenance, time and motion study, industrial fatigue, sales planning, industrial engineering, education and production engineering, the Society of Industrial Engineers held its eighteenth annual convention at Pittsburgh on Oct. 14 to 16. Throughout the sessions the growing need for industrial engineering was emphasized, and it was freely indicated that the depressed state of business has given the industrial engineer a greater opportunity than he has ever had before in making himself valuable to manufacturing operations.

The sessions of an entire day were given over to an evaluation of the contributions of the late Frank B. Gilbreth to scientific management and industrial engineering, and the annual award of a new medal, to be designated as the Gilbreth medal "for distinguished service to management," was announced. The high standard of work required to win the award was exemplified by its first bestowal on Dr. Lillian Gilbreth, Montclair, N. J., consulting engineer, lecturer and author, whose activity in furthering the work of her late husband has been of great value to industry. Joseph W. Roe, New York University, New York, and Morris L. Cooke, Philadelphia, paid fitting tributes to Mr. Gilbreth's work, following the award of the medal. The Emerson trophy, presented annually to a chapter of the society making the best record in the past year, was presented to the Detroit chapter.

Wide Scope of Time Study

The need for cooperation between the production engineer and the time study engineer in setting standards was ably demonstrated by George M. McIlveen, Crucible Steel Co. of America, Pittsburgh. Mr. McIlveen pointed out that the investigational phase of time study engineering is of great importance in order that a quick evaluation of the operation be attained only after a complete study of all the factors affecting it. These include the product itself, quality, tools and working conditions. It was suggested that after the basic factors influencing time study operations were carefully ascertained, the best pro-

cedure was to lay out a flow chart, indicating all the steps of the passage of a product through a factory. Complete cooperation between the time study engineer and the foreman or plant superintendent was stressed, and Mr. McIlveen pointed out that the time study engineer must also have a full understanding of motion study before setting up the operation.

In mentioning the many phases of business which may be affected by time study activity, the speaker mentioned the purchasing department, the employment department, the cost estimating department, and also the sales division. Eugene E. Brey, president, Pittsburgh chapter, Society of Industrial Engineers, pointed out that all these things made time study of definite value to industry, and that records of setups and experience should not be filed away after their original determination, but be constantly available to the other departments.

Depreciation and Policy Matter

Exhaustive analysis of depreciation policy on the part of industry was offered by Harold V. Coes, Ford, Bacon & Davis, Inc., New York, and David Himmelblaw, Himmelblaw & Co., Chicago. Mr. Coes defined and distinguished between the various factors affecting depreciation, and cited many instances of the policies being followed by large corporations. It was his contention that management of a sound business should lay aside large sums in times of prosperity as a reserve for reconstruction and betterment in periods of dull times. In this way a company would be given an opportunity during periods of slack business to prepare for the "boom" times which can be counted on to follow.

Mr. Himmelblaw outlined the various methods of depreciation being utilized in business today, and explained the factors which have brought about their adoption.

Maintenance Department as Source of Savings

Wider appreciation of the cost-reducing possibilities of proper maintenance—especially through preventive inspection—was reflected in the several discussions at a luncheon meeting of the maintenance engineering group.

"Only a few years ago the maintenance department was looked upon as an 'expense department,' whereas today it is being increasingly regarded as one of the major cost-saving departments," said E. C. Brandt, assistant works manager, Westinghouse Electric & Mfg. Co. The setup and functioning of the Westinghouse maintenance organization, which is divided into two main divisions—buildings, light, heat and power, and mechanical equipment—were outlined by Mr. Brandt. The maintenance inspection division is one of the most important of all, he said, better service, longer life and marked reduction in major repairs of equipment being attributed to the inspection activities. The adoption of maintenance standards has marked advantages, and use of incentive wage payment plans has reduced costs some 15 per cent, as compared with former records.

The principal phases of maintenance were also emphasized by J. E. Andersen, manager of structural maintenance, Pittsburgh Plate Glass Co., who outlined the methods used in the various plants of his company in connection with the upkeep of buildings and other structures. Inspectors are schooled in how and why things wear out, and a comprehensive questionnaire chart control has been developed for use by these inspectors. In this, the structural elements of major buildings, such as walls, coping, doors, etc., are listed, the interior of the buildings being similarly treated as regard to the inspectors. The analysis also covers the yards and small buildings. The educational work involves material relating to the process of deterioration of the various inside and outside units.

With this questionnaire, there has been developed a route sheet that indicates the most convenient method of inspection. An important part of the system is a summary inspection report sheet which, among other uses, provides a basis for estimating future upkeep costs. A building painting chart, covering paint to be used, number of coats, proper cycle, etc., is also a feature of the maintenance system.

The safety element of good housekeeping was stressed in the discussion, and cautions to the effect that the maintenance system must not be permitted to become topheavy were

voiced. That the trend has been toward a more thorough analysis and a higher evaluation of maintenance work than heretofore was a conclusion to be drawn from much of the discussion.

Prosperity in Depression

Of particular significance and interest was a talk by Roy H. Faulkner, president, Auburn Automobile Co., Auburn, Ind., who frankly discussed the reason for the outstanding success of his company during a year of great depression in the industry as a whole. Mr. Faulkner stated that the company was quick to see the trend of industry and to capitalize upon it. Continuing a tradition of production economy and combining it with the flexibility in operations, the Auburn company was able to turn over its inventory 27 times during the past eight months, and to make great reductions in both the cost and selling price of its product.

In discussing Mr. Faulkner's talk, R. H. Lansburgh, First National Bank, Detroit, stressed the fact that the Auburn company has avoided the tying up of a large working capital in plants and equipment, and by careful management has been able to produce many times the number of cars formerly possible in a few comparatively small factories. This has greatly reduced the company's overhead, and contributed much to its success.

Motion Studies Simplified

Motion studies reflecting the Gilbreth micro-motion technique, as well as the newer applications of motion study, were outlined by Ralph E. Blakelock, General Electric Co., Schenectady, N. Y., and Allan H. Mogenssen, vice-president in charge of time study engineering, Society of Industrial Engineers. Mr. Blakelock emphasized the importance of reducing all motion study work to 17 elementary movements, and of building the setup on this basis. He stated that the recent tendency has been to give more attention to the tools themselves than to methods employed in operating them, but that the human factor should be separated from the function of devices used in the proper micro-motion approach. The placing of tools and material at the work base is naturally of great importance, and coordinated operation of the hands is necessary. Both of the talks were illustrated by studies made recently of proper setup operations, most of which emphasized the great increase in production made possible by improvements over the old methods.

Officers Elected

John M. Carmody, editor, *Factory and Industrial Management*, was re-elected president of the society; E. A. Rummler, Chicago, treasurer, and George C. Dent, 1815 Engineering Building, Chicago, executive secretary.

Thawing of Credits Expected to Stimulate Business

More Money Will Be Placed in Channels of Commerce—Higher Interest Rates Also May Help

WASHINGTON, Oct. 20.—Development of the nation's credit structure on an increasing scale is being undertaken by the Government. This move is seen in the announcement of Secretary of the Treasury Mellon that gold notes of the National Credit Corp. will be accepted by the Government as collateral on deposits of public money in designated institutions.

By this action these notes are given the same collateral value that is accorded Government bonds, commercial paper and bankers' acceptances. Under the law these securities are accepted at 90 per cent of their face value.

With gold debentures of the National Credit Corp. given this rating, some half-billion dollars in collateral which banks use as security for currency the Government has deposited can be made available for other purposes. Banks will be able to increase their borrowing power from the Federal Reserve banks just as is taking place in connection with funds of States and counties. It follows that the credits are made liquid and money brought forth for trade and business.

The announcement of Secretary Mellon, coupled with plans of the National Credit Corp. to proceed with operations, brought the feeling that stimulation of business and building up of greater confidence may be expected. The wider credits, it has been pointed out, not only will thaw frozen paper and consequently place more money in the channels of commerce, but restored confidence would also do this and likewise put back into commercial activities the heavy withdrawals of currency which are now hoarded.

To Preserve Foreign Investments Here

Tying in with efforts to build up greater credits is the recent policy of the Federal Reserve System to raise interest rates. The thought appears to be that higher rates will invite investments and that capital which has lain idle because of cheap money will be put into circulation. It has been complained by banks that rediscount rates have been too low, with the result that cheap money, instead of encouraging investment and loans, has had the opposite effect. The condition of the bond market is pointed out to show that the effort to extend long-term credits through low rates of interest has not reached the desired objective. Rather, it is contended, the

trend has been toward short-term credits.

There also prevails the view that the higher rates are intended to preserve and increase foreign investments in the United States and to prevent a too rapid exportation of gold. The movement, if accelerated abnormally, it is maintained, might have the effect of changing orderly business temporarily. There is, of course, no apprehension that there will or can be withdrawals of gold from the United States, with its tremendous holdings of the yellow metal, that would in the least strain the reserves of the banks.

Since France and the United States possess the great bulk of the world's gold supplies, it is assumed that the forthcoming conference between Premier Laval of France and President Hoover will deal with the gold situation as one of the leading topics. Redistribution of gold supplies on a sound basis, with a view to reestablishing the gold standard in Great Britain and other nations which recently abandoned it, is generally accepted as being highly desirable to restore world business and relations on a healthy basis. It is held to be as important for France and the United States, as well as for the countries which are off the gold standard. An outstanding reason to support this point is that depreciated currencies mean cheaply produced goods which might be thrown in excessive quantities on the markets of France and the United States, with a demoralizing effect on industry in these two countries.

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In 1930 the nickel companies operating in the Sudbury district, Ontario, mined 2,127,043 tons of nickel-copper ores and produced 166,703 tons of matte as compared with 1,991,910 tons of ore mined and 132,030 tons of matte produced during 1929, according to a statement just issued by the mining, metallurgical and chemical branch of the Canadian Dominion Bureau of Statistics at Ottawa. Production of nickel in 1930, including the metal contained in matte exported, electrolytic nickel, nickel oxides and nickel salts sold, amounted to 103,768,857 lb. valued at \$24,455,133 as against 110,275,912 lb. valued at \$27,115,461 in the preceding year. This decrease in nickel production reflects the general and exceptionally severe business depression suffered throughout the world during 1930.

GEAR MAKERS DISCUSS BOTH TECHNICAL AND COMMERCIAL TOPICS

THREE sessions devoted to technical topics and two to commercial standards made up the fifteenth semi-annual meeting of the American Gear Manufacturers' Association, which was held at the William Penn Hotel, Pittsburgh, Oct. 15 to 17. In addition, an afternoon was devoted to inspection of the Nuttall works of the Westinghouse Electric & Mfg. Co., and the plant of the Pittsburgh Gear & Machine Co.

Two addresses on tip relief, one on speed reducers—all three of high caliber—and the progress reports and round table meeting of some 12 standardization committees featured the technical program. The discussions of commercial standards comprised several addresses devoted for the most part to various phases of cost accounting practice.

The next meeting of the association will be held at Cleveland during the second week in May, the exact date to be announced later.

Tip Relief Comprehensively Reviewed

FACTORS to be considered in specifying the kind and amount of tip relief were covered in a paper on "The Practical Aspects of Tip Relief," by T. R. Rideout, Nuttall works of the Westinghouse Electric & Mfg. Co. This paper, together with a companion one by R. E. Peterson of the Westinghouse company, on the theoretical aspects of the subject, received general commendation.

Mr. Rideout's paper was confined to tip relief as applied to generated involute gearing where the pinion is always the driver. "Theoretically, tip relief would not be necessary on accurate gears constructed of an inelastic material," he said. "In fact, use of tip relief is often referred to as an error introduced to compensate for other errors in the gears themselves. As errors in gears are unavoidable, it does not seem justifiable to refer to the corrective measure as an error. Tip relief also serves other purposes than to compensate for gear errors, so the use of the above definition seems doubly unjustifiable."

In order to obtain smooth running, quiet, long wearing gears, tip relief in some form or amount was said generally to be necessary. If not taken too literally, the old saying: "Gears wear out until they wear in and then never wear out" is quite true, said Mr. Rideout. "Although gears will wear out eventually, the rate of wear is much less after the inevitable feed marks and surface imperfections of a pair of new gears have been worn away," he continued. "It sounds paradoxical, but the judicious use of tip relief has proved itself to be of value in reducing the actual amount of wear. Without re-

lief, the initial rapid wear will form a ridge in the flank of the pinion tooth and round off the tip of the mating gear tooth. Use of tip relief on the gear tooth prevents that rounding at the tip of the tooth, which, when once started, continues at a rapid rate and soon reaches a point where the profiles are no longer conjugate. Once a pair of gears having tip relief have passed through the stage of rapid wear, the relief is continued automatically by the subsequent wear, although to a lesser amount than originally produced. This fact is believed due to the greater wear rate at the tips of the teeth, where the amount of sliding is the maximum." The greater smoothness of action of gears having tip relief was attributed in part to the decrease of the arc of approach action.

Deformation Factor Made Necessary by Higher Speeds and Loads

Regarding the factor of deformation, it was pointed out that although the deformation of the teeth under load is very slight under normal conditions and moderate loads, the increasing tendency for higher speeds and loads makes it necessary to check these deformations to determine if there is a possibility of their causing interference.

Following his description of the advantages or necessity of tip relief for theoretically accurate gears, Mr. Rideout covered the factors that produce interferences in gears produced commercially, errors incident to heat treating and hardening, as well as those caused by production machinery and tools. Errors caused by distortion are more difficult to analyze than ma-

chining errors where the accuracy of the machines and tools is fairly well known, he said. Only experience and the keeping of records of the errors introduced by heat treatment enable the estimation of the amount of relief necessary.

The different methods of correcting interference were outlined by Mr. Rideout. "A very satisfactory way of eliminating interference due to errors and compensating for tooth deflection and deformation is that of making the base pitch of the gear shorter than that of the pinion," he said. This is known as the differential base pitch method, and is not practical for hobbled gearing, for its use necessitates a hob of different pressure angle for both pinion and gear, and the cost is prohibitive. It is, however, of particular advantage for ground gears, the differential being easily obtained by shifting the formers on a form grinding machine or by changing the wheel setting on a generating grinder.

Charts showing the tip relief produced by a given correction and the effect of that tip relief on the number of teeth in contact were an interesting part of Mr. Rideout's presentation, which also included discussion of some of the limitations of tip relief.

Analytical Study of Tip Relief

The paper on "Theoretical Aspects of Tip Relief," by R. E. Peterson, Westinghouse Electric & Mfg. Co., covers only deformations and errors, the analysis being with reference to premature engagement, which gives a gouging action, and delayed engagement, which gives a scraping action. An equation was offered for determining how much tip relief both as to form and amount to allow to prevent these conditions. The analysis also included study of how far down the tooth the tip relief should extend.

The general conclusion of this analytical study is that to prevent both premature and delayed engagement the tip relief should be twice the maximum error plus an amount for deflection. The amount for deflection should be in general less than 0.001 in. per 1000 lb. per inch of face. A circular clearance of 0.001 in. was said to be enough to take care of average deflection.

In the discussion of the papers it seemed agreed that tip relief is generally necessary but that it is better to have too little than too much. Also that it should be on the gear rather

than on the pinion. It was apparent that application of tip relief is regarded as an involved matter, one requiring delicate consideration as to how far to go with it in each particular application. All of the discussion referred to commercial gearing, the tip correction being intended to compensate for hardening distortions and inaccuracy in machining.

The necessity of having one hob for the pinion and a second one, with relief, for the gear was pointed out by some as increasing tool expense. But in this connection it was stated that there was no practical need for the two hobs, since the hob with relief may be used for both gear and pinion; in this case the tip relief will naturally be less on the member having the smaller number of teeth, i.e. the pinion. This obviates having one hob for each, and eliminates the question of extra tool expense. It was also pointed out that although the tip relief correction tends to do away with interference, if carried too far, it also reduces the arc of action and tends to make the gear noisy. Where relief is excessive, the top of the tooth becomes ineffective and might as well be cut off. In this connection it was brought out that if tip correction is heavy it should be as gentle as possible so that the full involute action might take place as quickly as possible.

Association Activities Benefit Gear Makers

PRECEDING the usual semi-annual round table meeting of individual technical committees, an illuminating picture of benefits accruing from participation in the association's work was drawn by F. W. Sinram, president Gears & Forgings, Inc., Cleveland, and honorary president of the association, in an address on "How the A.G.M.A. Has Benefited the Gear Manufacturer." These benefits, it was indicated, contemplate attendance at meetings and cooperation in the formulation and use of standards, both technical and commercial.

Opportunity for furthering friendships among men in the industry, addresses and papers on all phases of gear manufacture—many of them notable contributions to the art—and discussion of such papers by many of the leading authorities in the industry are advantages afforded by the A.G.M.A. meetings.

Speaking of technical standards, Mr. Sinram said: "If your education or training is technical or mechanical, membership on one of the A.G.M.A. committees spells opportunity. In committee meetings you rub shoulders and are privileged to exchange ideas and experiences with some of the best minds in the industry. Can you properly evaluate the time spent in serious discussion with such men as Earle Buckingham, E. W. Miller, B. F. Waterman, A. A. Ross, F. E. McMullen, H. J. Eberhardt and the many others of recognized engineering and

mechanical ability that I might mention?"

It was pointed out that the association has evolved 32 standard recommended practices and has many more under consideration. "Some of these are now American standards—more will be," said Mr. Sinram.

Urges Use of Established Standards

The necessity of using these standards was emphasized. "Unless you are using them, you are not doing justice to yourself, the trade, the A.G.M.A. and the many able and loyal men who have taken part in our standardization activities," he said. "After all, what makes a standard is general use. Every executive should see that his force is adequately supplied with all A.G.M.A. data and making proper use of it."

Discussing commercial standards, Mr. Sinram stated that more general use of the association's uniform cost accounting procedure would be of marked value to the industry. Increased activity in the collection and dissemination of statistics of value to members of the association was urged. "For the benefit of ourselves, and our relations with other organizations and Government departments, we should know the total amount of capital invested in our business, the aggregate annual volume, properly classified, the total number of people employed and such other information as will enable us to function to the best advantage as an industry organization," he said. "It devolves on us to distribute information periodically on unfilled orders, business booked, shipments, etc. A start has been made—but to be effective the data must represent the entire membership—the industry."

The growing importance of trade association work was emphasized. "We face a new era, the demands of which promise to be most exacting," said Mr. Sinram. "There is every indication of the increasing importance of the trade or industry organization, now generally recognized as part of the plan of modern business. Without organized industry you have no industry. Never before could those interested in the same fields counsel together with greater profit. Fortunately, in the A.G.M.A., the gear manufacturers have an industry organization built on a solid foundation and with a heritage of high ideals ready to serve them."

Technical Standardization Going Forward

In outlining the past half year's activities of the technical committees, A. A. Ross, engineer General Electric Co., West Lynn, Mass., and chairman of the association's general standardization committee, announced a new item on the program of several committees. This is a "requisition blank," which is a standard form that would

show in full what information a purchaser should furnish when asking for a bid or ordering any particular type of gear. By eliminating correspondence made necessary because of insufficient data, the proposed form should make for quicker estimates and deliveries. The library committee is collecting samples of existing forms of this type and will place them at the disposal of the various committees concerned.

B. F. Waterman, engineer Brown & Sharpe Mfg. Co., Providence, R. I., and president of the association and A. G. M. A. representative on the Sectional Committee on the Standardization of Gears organized under the procedure of the A. S. A., reported that the A. G. M. A. 20-deg. full depth involute form recommended practice is now before the sectional committee; also the association's system of gear nomenclature and its recommended practice for gear inspection. It was announced further that the sectional committee's subcommittee No. 5 on helical gears, of which Ira Short, engineer, South Philadelphia works of the Westinghouse Electric & Mfg. Co., is chairman, has reached an agreement on the fundamentals of its proposal for herringbone gears with the exception of the tooth load formulas. Recommendations as to the latter are held up pending certain tests on the helical teeth to be conducted by Prof. Earle Buckingham at Massachusetts Institute of Technology. It was stated that there probably will be two formulas: one a beam formula and the other a compression formula for point of contact.

A. G. M. A. Nomenclature Before Sectional Committee

The recommended practice of the A. G. M. A. nomenclature committee, the adoption of which was a feature of the association's last meeting, is now being studied by the subcommittee on nomenclature of the sectional committee on gears. In the matter of nomenclature, the gear committee has, through this subcommittee, established contact with the sectional committee on Scientific and Engineering Symbols and Abbreviations. To correlate the work of the two committees without overlapping, three members of the symbols committee will work with the subcommittee on gear nomenclature. The object, as indicated in a communication from Dr. S. A. Moss of the symbols committee, is to correlate the list of gear symbols with all other lists of symbols; to introduce the point of view of the symbols specialists, and to make the necessary arrangements to include the gear committee's lists of symbols with all other lists arranged by the symbols committee. It is also proposed that there be added a list of symbols for stresses in gears so that when the work is done there will be a complete list of symbols for all kinds of mathematical work with gears. D. T. Hamilton, Fellows Gear Shaper Co., Springfield,

is chairman of the A. G. M. A. nonmetallic committee.

The metallurgical committee headed by C. B. Hamilton, Jr., president, Hamilton Gear & Machine Co., Toronto, Canada, has been working with subcommittee VIII of the A. S. T. M. Committee A 1 on steel. The manganese content of case hardening steel is still under discussion. There have been three proposals: 0.30 to 0.60 per cent manganese, which is the same as S. A. E. 1020 steel; 0.40 to 0.60 manganese and 0.40 to 0.70 manganese. The objection to the first is that if the manganese should fall between 0.30 to 0.40, the steel might not be clean, while the 0.40 to 0.60 per cent proposal was said to be open to objection by steel makers, who regard it as too narrow a range.

The non-metallic gearing committee, which is headed by H. R. Moyer, Westinghouse Electric & Mfg. Co., is investigating the A. G. M. A. recommended practice relating to the design of rawhide gears with a view to suggesting changes if necessary. The question of a wear factor will be taken up in connection with the recommended practice relating to strength and horsepower of phenolic and rawhide gears. Another active item is tolerances for non-metallic gearing.

Tip relief, and thickness of rim under the teeth of gears are active

items in the agenda of the railway, mill and mine gear committee, the chairman of which is T. R. Rideout, engineer, Nuthall works of the Westinghouse Electric & Mfg. Co.,

Many Problems Met In Developing Standardized Speed Reducers

The evolution of Falk gear speed reducers and some of the principal considerations that have governed their design were outlined by P. C. Day, Falk Corp., Milwaukee, in an address on "Good Practice in the Manufacture of Speed Reducers."

The term speed reducer, it was pointed out, covers the smaller units for which there is sufficient demand to enable the manufacturer to standardize on a number of selected designs and sizes and to manufacture them in quantities with interchangeable parts. Engineering and design are completed before a line of speed reducers is put on the market, and a catalog is published in such form that the purchaser can make his own selection.

Falk reducers are confined to the herringbone type with parallel shafts and combinations of spiral bevel and single helical gears for right-angle transmissions, horizontal and horizontal-vertical.

From Mr. Day's presentation it was

evident that the designer and manufacturer of speed reducers have a number of difficult problems to solve. The maker of special machinery is looking for a superior product at a reduced cost, and the only answer to this problem is standardization and quantity production, he said.

The Falk line of standard reducers comprises 177 different units, and every unit must be provided with a number of different gear ratios. In all there are 95 ratios; this gives the large total of 2789 different standard combinations. Then additional modifications have to be provided in order to adapt the units to unusual conditions of speed and temperature. Finally, a standard line of motor bases must be designed to fit any motor that can be used with any unit. From an engineering standpoint this is the least important problem, but it is the hardest of all to include in a program of standardized manufacture, he said.

The features of the first line of all-herringbone reducers was introduced by the Falk Corp. in 1915, and the design and manufacturing problems of the later standardized lines were interestingly outlined by Mr. Day. The magnitude of the task, both as to design and manufacture, in developing the standardized line was commented upon in the discussion.

Limited Freight Rate Increase Granted on Iron and Steel, Machinery and Raw Materials

WASHINGTON, Oct. 20.—The Interstate Commerce Commission today, in denying the application of the railroads for the horizontal 15 per cent increase in rates, made suggestions for a specific increase in a long list of commodities, including iron and steel and raw materials entering into their manufacture. The proposed increase on manufactured iron and steel on both carload and less-than-carload lots would be 2c. per 100 lb.

The increases suggested are made subject to a number of provisos. In no event shall the increase on any carload be in excess of 10 per cent of the carload charges which would be assessed in the absence of the increase. In the case of less-than-carload freight, no increase would be assessed for hauls for which the applicable or corresponding class rates are assessed on a basis of not more than 175 miles, and the increase for hauls over 175 miles and not more than 250 miles computed in like manner shall be 1c. per 100 lb. Where rates are stated in schedules in dollars per car and the increase is an amount per 100 lb., the increase shall be \$7.50 per car if such amount per

100 lb. is 1c. and \$10 per car where the increase is 2c. per 100 lb.

The commission's suggestions provide for an increase of \$10 per car in the case of iron and steel machinery and other products. This is proposed on all commodities for which a 2c. increase per 100 lb. is suggested where the rates are stated in dollars per car. It would be \$7.50 per car where the increase is 1c. per 100 lb. The commission also suggests that all switching charges may be increased 10 per cent, excepting in the Chicago switching district. Proportional international joint rates would not be increased, but those applying within the United States may be increased to the extent approved for domestic rates. Joint rates with boat lines also would be increased.

Specific increased rates per car are named for raw materials entering into the manufacture of iron and steel. The proposed increase on coal, coke and iron ore is \$3 per car. On pig iron and scrap the proposed increase is \$6 per car.

The plan for increases is estimated to produce between \$100,000,000 and \$125,000,000 on the basis of present traffic if applied both intrastate and

interstate. The commission proposes to limit the increased rates to a period ending March 31, 1933. It said that continuation of the increase after that time will depend upon conditions then existing. Whether the railroads will put the rates into effect and when are matters to be decided by the carriers.

The proposed increases are to be filed on or before Dec. 1 for approval by the commission of the plan for division among the railroads of the gross proceeds derived from the higher rates.

Fulton Iron Works Co., St. Louis, which filed a voluntary petition in bankruptcy in the United States District Court there last month, has made an offer of composition to creditors, which contemplates issuance of 5-year 6 per cent notes for 60 per cent of creditors' claims and 10-year 8 per cent notes for 40 per cent. The creditors' committee is recommending acceptance of the offer. Claims against the company total approximately \$1,400,000. The company manufactures sugar mill machinery and Diesel engines.

Will Probably Hold Machine Tool Show Next Fall

Machine Tool Builders Last Week in Chicago Discussed Also Industrial Stability and Swope Plan

HERE will probably be a machine tool show next fall in Cleveland. Such was the consensus of opinion so far as a relatively brief discussion of the topic would divulge at the annual meeting of the National Machine Tool Builders' Association last week at Chicago. The fact is significant in view of the low state of activity at the present time in the machine tool industry and of the lack of promise for the immediate future.

What happened was the meeting voted to proceed with the sending to the membership of the reservation blanks for space at the exposition. These require an initial payment with the request for reservation, and it was held by a number that early returns would supply a sufficiently strong response to direct the management to follow through on the plans to which the association is more or less committed. The underlying views, except on the part of one or two who voiced a protest against attempting the show, were that conditions a year hence would justify the exposition.

The meetings, which were held at the Edgewater Beach Hotel, Oct. 12, 13 and 14, as the thirtieth annual convention, were attended by representatives of 85 of the 150 odd member companies. Some of the high spots were an address by Ralph E. Flanders, general manager, Jones & Lamson Machine Co., Springfield, Vt., on the relation of the industry to the business cycle; some resolutions subsequently introduced by Mr. Flanders through the association's committee on resolutions, a discussion of the Gerald Swope plan for the stabilization of industry and an address on Russia by John M. Carmody, editor, *Factory and Industrial Management*.

Meeting Depression Problems

Mr. Flanders, in his address, was emphatic that neither individual industries nor industry as a whole can take full responsibility for the fluctuations of business. They lie, he said, in the balance between savings and investment. The resumption of new investment is the key, he added, to the resumption of general prosperity. We must insist that the claims of an important school of economists be examined as to the practicability of controlling the price level. His point was that resumption of new investment is unlikely so long as the price trend gives hope of more advantageous purchasing later.

The resolutions mentioned (1)

called on the President to arrange for an international conference to consider means for stabilizing monetary standards;

(2) put the association on record as approving the ideas back of the Swope plan, while holding that some factors affecting business fluctuations lie in the fields of finance and general public speculation, and that past history is against measures calculated to tighten the bands of government regulation or control;

(3) urged new investment as the normal outlet for idle funds, and that courage and wisdom in their disposition may be expected to mitigate greatly the severity of a depression.

Most of the discussion revolved about unemployment benefit plans, particularly that of Rochester. This was explained by James E. Gleason, president, Gleason Works, of that city. Under the plan a man may re-

ceive as a maximum 60 per cent of his wages for a period of 13 weeks. The minimum period, for one who has not long been employed, is 5 weeks. In operation, it was discovered that the rotation of jobs can be extended far beyond expectations. Thus, the employment manager found it possible to release an otherwise full-time key employee one week out of four and more men were rotated than seemed feasible. The cost was put at an average of $\frac{3}{4}$ per cent of the payroll.

General Manager Ernest F. DuBrul reported that the cost manual drawn up by the association would shortly be available for distribution. He pointed out its adaptability to machine tool users. Extra copies to members have been priced at \$10 a copy and to non-members at \$20.

Three new directors were elected, as listed on this page, to succeed Carl A. Johnson, president, Gisholt Machine Co., Madison, Wis., who has been president of the association for the past two years, and E. J. Fullam, secretary and treasurer, Fellows Gear Shaper Co., Springfield, Vt., and Frederick V. Geier, vice-president, Cincinnati Milling Machine Co. The board in turn elected new officers, whose portraits are here reproduced. The new president, Robert M. Gaylord, conducted most of the last session of the convention.

NEW OFFICERS NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION



R. M. Gaylord



C. R. Burt



H. S. Beal

PRESIDENT

Robert M. Gaylord,
President, Ingersoll Milling Machine Co.,
Rockford, Ill.

FIRST VICE-PRESIDENT

Clayton R. Burt,
President and general manager, Pratt &
Whitney Co., Hartford, Conn.

SECOND VICE-PRESIDENT

Henry S. Beal,
Assistant general manager, Jones &
Lamson Machine Co., Springfield, Vt.

DIRECTORS

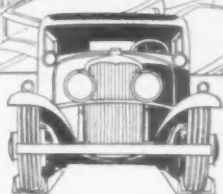
S. Owen Livingston,
First vice-president, Gallmeyer & Liv-
ingston Co., Grand Rapids, Mich.
Edward A. Muller,
President and treasurer, King Machine
Tool Co., Cincinnati.
H. S. Robinson,
Secretary and sales manager, Cincinnati
Shaper Co., Cincinnati.

TREASURER

George E. Randles,
President, Foote-Burt Co., Cleveland.

*Reelected.

OFF THE ASSEMBLY LINE



Spurt in Automobile Manufacturing Is Expected in November

DETROIT, Oct. 19.

ALTHOUGH there is slight likelihood of an acceleration of automobile production the remainder of this month, developments in the past week indicate a pick-up in November. It now looks as though October will be not only the poorest month of the year, but the lowest in volume of output in a decade. Total assemblies are not expected to be more than 125,000 units and may not get above 110,000, the amount depending on what the Ford Motor Co. does. Manufacture in December, 1929, was 125,502 units, but to find a month with a smaller production one must go back to January, 1922.

Never has Detroit witnessed such feverish preparation for new models and such secrecy on the part of automobile makers. After a year of unprofitable operation by most companies, it is only natural that those which have shown losses should exert extraordinary efforts to stage a comeback and that those which have maintained a relatively good standing should seek to hold their gains. The motoring public is apathetic just now and the industry as a whole believes that it will take radical innovations in body design and perhaps mechanical equipment, as well as unusual price values, to jolt it out of its indifference and loosen its tightly-held purse strings.

Under the circumstances, several motor car builders are planning to expand their lines, involving large expenditures, while others are investing heavily in new dies. Frankly, they are doing this with considerable qualms, feeling that their investments are much more of a gamble than under normal conditions. They are watching each other closely, guarding their secrets zealously and are changing their programs constantly as they discard one plan already under way for a new one. In other words, they have a case of "jumpy nerves," with the re-

October motor car output is estimated at 110,000 to 125,000 units, the lowest in a decade.

* * *

Ford Motor Co. is expected to begin production of its new car about Nov. 15. Its tentative schedule is said to be 60,000 cars during remainder of year and 75,000 in January.

* * *

Never has Detroit seen such feverish preparations for new models and such secrecy on the part of automobile makers as today.

* * *

General Motors will employ as many men the coming winter as last, perhaps more, states R. H. Grant, vice-president.

▼ ▼ ▼

sult that scarcely ever has the industry been so undecided this late in the year regarding the character of its new offerings.

Spurt Next Month Expected

It is the knowledge that they must get off to a right start if 1932 is to bring a revival of buying, coupled with the desire to provide as much work as possible for their employees during the winter months, that has prevented automobile companies from going ahead faster. As the end of October approaches, however, there are increasing signs that output should take a spurt next month. The Chevrolet gray iron foundry at Saginaw resumed work today on a four-day a week schedule, following a month's idleness. Within the next week or 10 days the gear and axle plant and the forge plant in Detroit will be manufacturing parts for the 1932 car, while assemblies should be

started at Flint about Nov. 2. Chevrolet already has given some releases for steel ordered several weeks ago for its first 50,000 cars; deliveries are designated for the last week of October and the early part of November.

The Ford Motor Co. probably will begin production of its improved model A car at the Rouge plant about the middle of next month. Its tentative program is said to call for 60,000 cars by the end of the year and 75,000 for January. It is reported that the first car was to have been ready for inspection by high Ford officials at this time, but delays incurred by indecision regarding certain parts to be incorporated in the new car made this impossible. It still is believed that the company is planning to have at least one car in the hands of each dealer shortly after Thanksgiving for display purposes, but actual deliveries to customers will not be made until January. Ford has completed its purchases of sheets for 50,000 cars, but still has bars and strip steel to buy. It placed some steel for its frames the past week. However, releases have been given for little of this material, so that the awarding of business thus far has meant nothing except the promise of an early step-up in rolling mill schedules. Ford is understood to have given no releases to large suppliers of parts, so that they are unable to tell what their production requirements will be during the remainder of the year. This is the reason that most of the suppliers have not placed steel orders. There are said to be some parts for the new Ford which are only in the development stage. For instance, no decision has been made about the type of brakes to be used. As predicted in this column several weeks ago, it is believed that Ford will use carbon steel instead of rustless steel for the radiator shell, with a strong possibility that the color of the shell will be the same as that of

the car itself. So far as purchases of sheet steel are concerned, Ford is not expected to be in the market again until some time in November.

Plans of Other Companies

Chrysler is preparing to offer a number of new things in 1932. Each of its plants will be closed for two weeks or perhaps longer for tooling up for new models, these shut-downs being staggered rather than occurring simultaneously. Plymouth as well as the other divisions is included in this program. It is expected that Plymouth will have a new body after the first of the year. A much-talked-about development is the possibility that "floating power" will be extended to at least some other Chrysler-made cars than the Plymouth. Meanwhile, Plymouth is going along on a greatly reduced basis compared with last month, the Dodge passenger car division is closed and Chrysler and DeSoto divisions are operating at a low rate.

Hudson is in the midst of work on both Hudson and Essex cars which probably will be greatly altered in appearance next year. Observers are inclined to dismiss the report that Hudson will put on the market a new, low-priced car, believing instead that efforts will be concentrated largely on putting the Essex in a stronger competitive position with Ford, Chevrolet and Plymouth. The new Hudson offerings are not likely to appear as early as some people think, as the company still is working on body dies.

There is a report going the rounds that the new Studebaker-sponsored car to be built in Detroit will be called the Rockne. In this connection it will be recalled that Knute Rockne was appointed sales promotion manager of the Studebaker company just prior to his tragic death in an airplane crash. It is said that an Eastern body maker already has contracted to furnish the bodies for this new car.

Hupmobile to Concentrate Manufacturing

Hupmobile has announced that after Dec. 1 all of its cars will be made in Detroit, whereas the six-cylinder car heretofore has been manufactured in its Cleveland plant, formerly the property of the Chandler company. The Cleveland unit is to continue as a body-producing department for Hupmobile. Nash likewise is making changes, moving operations from its Milwaukee factory to its main plant at Kenosha. The forgings, castings and some of the body work, including many stampings, have been made at Kenosha and hauled to Milwaukee by truck. In consolidating the plants, the company will save substantially on transportation of materials. Seamon Body Co., Nash affiliate, will not be affected by the move.

In helping to solve the unemployment problem this winter, the automobile industry has taken on its shoul-

ders a lion's share of the burden. In a recent address, R. H. Grant, vice-president in charge of sales of General Motors, declared that the various manufacturing divisions would employ at least as many men this winter as last, and perhaps more. Charles S. Mott, General Motors vice-president, said Saturday that the company will adopt a double-shift system in all departments where it is feasible, starting with several departments of the Buick company. It has not been decided whether the double-shift system will mean two-and-a-half to three

days of work a week for each employee or whether the shifts will alternate weekly. The Willys-Overland company, through President L. A. Miller, has announced that during the remainder of the year it will produce cars in excess of requirements to give work to its employees. During this month and next the factory will spend \$330,000 in wages and \$600,000 for materials in carrying out this program. Dealers are taking cars as an addition to present stocks and are selling them at reductions of from 10 to 25 per cent.



Metal Workers Hear Talk on Rustless Steel

A non-technical address on rustless steels, outlining their chemical and physical characteristics, and peculiarities encountered by the metal worker in fabricating them, was given to about 700 guests of Joseph T. Ryerson & Son, Inc., at the company's Jersey City, N. J., warehouse, Oct. 17. The speaker, G. Van Dyke, of the Ryerson organization in Chicago, has had long experience in the field of stainless alloys of steel.

The corrosion-resistant alloys were roughly divided by Mr. Van Dyke into three groups: stainless steel, containing 0.35 per cent carbon and 11 to 14 per cent chrome; stainless irons in three classifications, ranging from 0.12 per cent and under to less than 0.25 per cent carbon, and containing 12 to 16, 16 to 20 and 26 to 30 per cent chrome; and chrome-nickel irons, containing under 0.15 or 0.20 per cent carbon, 17 to 20 or 22 to 25 per cent chrome, and 7 to 10, or 10 to 13 per cent nickel.

While most of the address was devoted to the characteristics and working properties of the chrome-nickel irons, Mr. Van Dyke pointed out the great possibilities offered by the stainless alloy with under 0.12 per cent carbon, 16 to 20 per cent chrome and no nickel. He suggested that this alloy might promise much in tonnage material for the future, and with lower production costs should be suitable for sizable structures, even bridges.

On charts distributed to those in attendance, Mr. Van Dyke pointed out certain facts for the metal worker to bear in mind when buying and using high chrome-nickel alloys. Certain of these charts demonstrated that in tests for corrosion resistance in 1 per cent sodium sulphate and 3 per cent free sulphuric acid at 300 to 320 deg. F., and a disintegration test in a hot solution of 10 per cent copper sulphate and 10 per cent sulphuric acid, resistance to corrosion in one case and complete disintegration in the other test, increased directly with the increase of the total percentage of alloy, and the carbon content was apparently without effect.

The user of stainless alloys often misunderstands the literature furnished by the producers, he said, and even among large consumers, improper knowledge of the action of austenitic steels under heat treatment has resulted in impairing the austenitic qualities by too slow heating. He emphasized that in heat treating these alloys, the danger point to the austenitic structure is between about 1200 and 1550 deg. F., so that rapid heating to points above this range and quick quenching are necessary.

In working the chrome-nickel alloys, however, he stressed slow speeds, with deep, heavy cuts. In machining, he pointed out that high speed cutting is a disadvantage, slow speeds and deep cuts, well under the surface, bringing the best results. This method also applies to drilling, where slow speed and a heavy, steady pressure is the most successful. This peculiarity is due to the fact that the chrome-nickel alloy rapidly work hardens, and with cold working its tensile strength may be increased to as much as 300,000 lb. per sq. in.

In using oxy-acetylene welding, it was pointed out that as nearly a perfect mixture of acetylene and oxygen as possible is desirable. As a perfect mixture is not possible, the welder should lean slightly to an excess of acetylene rather than oxygen, which rapidly combines with the carbon.

After the address the group was conducted through the Ryerson warehouses, where the company's machines for cutting large shapes, profiling plates, corrugating sheets and other fabrication work were in operation. A buffet luncheon was served while guests viewed a special exhibit arranged to demonstrate by actual operation the drilling, welding, soldering, grinding and polishing of Allegheny metal, for which Joseph T. Ryerson & Son, Inc., is distributor. The machines used were those for which the machinery division of the company is agent.



Louisiana-Texas Waterways Corp. has placed orders for two towboats and 10 barges for use in freight transportation service on the Intercoastal Canal between New Orleans and Houston.

PERSONALS

HARRY J. FISHER, whose appointment as manager of sales for the Aetna-Standard Engineering Co., Youngstown, was announced in *THE IRON AGE* last week, has spent his entire business career in sales engineering work connected with the steel industry of the United States and Canada. He was graduated from the University of Michigan in 1913 and, following an apprenticeship with the Electric Controller & Mfg. Co., Cleveland, he joined this company's sales organization in the Pittsburgh district. In 1917 he went with the Reliance Electric Engineering Co., Cleveland, as Pittsburgh manager of sales, having opened the company's office in that city. In 1919 he was transferred to Cleveland and three years later was placed in charge of the company's steel mill sales. He has been instrumental in the development of numerous steel plant improvements, including the application of electric motors to wire blocks and the development of individually driven table rollers. Mr. Fisher will establish his headquarters in Youngstown on Nov. 2.



H. J. FISHER

tion of outstanding accomplishment in management engineering" and will be presented at a special dinner in his honor at the Hotel Pennsylvania, New York, Oct. 29.

SIBBALD REID, who has been identified in various capacities since 1925 with the American Rolling Mill Co., Middletown, Ohio, has been appointed assistant district manager of its Pittsburgh office.

E. R. DOUGHERTY has joined the Chicago district sales staff of the American Manganese Steel Co., Chicago Heights, Ill.

BENJAMIN B. THAYER, vice-president, Anaconda Copper Co., has been appointed a divisional chairman of the non-ferrous metals committee, commerce and industry division, Emergency Unemployment Relief Committee in New York.

C. K. STRAUSBAUGH has been made vice-president in charge of sales of the Mead-Penn division of the Pennsylvania Engineering Corp., with headquarters at New Castle, Pa.

L. P. ALFORD, consulting editor of *Factory and Industrial Management* and the author of many books on management, has been awarded the Henry Laurence Gantt Memorial Medal by the Gantt Medal Board, consisting of representatives of the American Society of Mechanical Engineers and the Institute of Management of the American Management Association. The medal is given annually "in recognition

FRED A. WALES, heretofore vice-president of Aluminum Colors, Inc., and actively engaged in the development of the Alumilite process for treating and coloring aluminum and its alloys, Indianapolis, Ind., has been elected president of the company. **RALPH E. PETTIT**, formerly with the research department of the Aluminum Co. of America, has been appointed sales engineer.

J. G. LLEWELLYN, for over two years assistant sales manager of the Bell & Howell Co., Chicago, has been promoted to the sales managership. Prior to his present connection, he was identified for 11 years with A. M. Castle & Co., Chicago, steel jobbers.

DR. MICHAEL I. PUPIN has been awarded the John Fritz Gold Medal for 1932 for his achievements as "scientist, engineer, author, inventor of the tuning of oscillating circuits and the loading of telephone circuits by inductance coils."

A. B. WALLINGER, for 13 years representative of the Wisconsin Bridge & Iron Co., Milwaukee, at Kansas City, Mo., has been promoted to be manager of its Chicago office, with headquarters at 1629 Monadnock Building. The Kansas City territory, comprising seven States, will remain under his supervision.

JAMES A. FARRELL, president, United States Steel Corp., will address the banquet on Thursday night, Oct. 29, at the ninth annual convention of the American Institute of Steel Construction, to be held Oct. 27 to 30 at the Greenbrier, White Sulphur Springs, W. Va.

N. E. WAHLBERG, chief engineer, Nash Motors Co., Kenosha, Wis., since its establishment in 1916, has been elected a vice-president of the company, in charge of engineering.

PAUL G. LEONI, managing director, William H. Muller & Co. and the Iron & Ore Corp. of America, New York, celebrated his twenty-fifth anniversary with the Muller organization on Oct. 15. His first connection with the company, which owns iron ore mines in North Africa and is a leading exporter of ores with headquarters at The Hague, was in the London office. After four years, he was transferred to the Paris branch as assistant manager and five years later, in 1916, he opened a selling office for ores and alloys in New York, incorporated as the Iron & Ore Corp. of America. Later this office was combined with the William H. Muller & Co. branch in New York, which handled its shipping and grain interests.

MYRON C. TAYLOR, chairman of the finance committee of the United States Steel Corp., New York, and **EDWIN HODGE, JR.**, president of the Pittsburgh Forgings Co., Pittsburgh, have been elected to the board of directors of the Pittsburgh & Lake Erie Railroad Co.

F. L. STEPHENSON, for the past six months in the McClintic-Marshall Corp. sales office in Philadelphia, has been appointed manager of structural and plate sales in Philadelphia for the Bethlehem Steel Corp., succeeding the late Frederick von Hiller. Connected with the Delaware & Hudson Railroad in 1916, he resigned to enter naval aviation during the World War. From 1919 to 1928 he was production manager of Bethlehem Fabricators, Inc., Bethlehem, having left to join the structural and plate sales division of Bethlehem Steel as assistant to Frederick von Hiller. When McClintic-Marshall was absorbed by Bethlehem Steel, he was transferred to the sales staff of the former company.

L. U. MURRAY, district manager of the industrial department, east central district, of the General Electric

Co., with headquarters at Cleveland, has been appointed manager of the Graybar-Western Electric department, with headquarters in Schenectady. Mr. Murray succeeds the late R. S. Johnston. J. P. JONES, manager of the machinery manufacturers' section of the industrial department in Schenectady, has been appointed district manager of the industrial department, east central district, to succeed Mr. Murray. J. J. HUETHER has been appointed to succeed Mr. Jones as manager of the machinery manufacturers' section, industrial department.

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Associated Machine Tool Dealers Hold Convention

The Associated Machine Tool Dealers convened for their regular semi-annual meeting at the Olympia Fields Country Club, Chicago, Oct. 14 to 16.

Initiating the program of activities was a fellowship dinner Oct. 14, at which the dealers were hosts to the members of the National Machine Tool Builders' Association. A large representation of makers and merchandisers of machine tools was in attendance at this dinner, at which E. P. Essley, president of the dealers' organization, presided.

Assistant Secretary of Commerce Julius Klein was the principal speaker at the dinner meeting and dwelt upon the relation of the machine tool building and selling fraternity to some of the outstanding present-day industrial and business problems. He was followed by Dr. A. D. Albert, director of plans and program of the Chicago 1933 World's Fair, who described the methods of financing and arranging the principal features of the exposition.

An association meeting was held on Thursday morning, Oct. 15, at which a number of papers were presented on the subject of market and sales analysis, time payment financing of equipment and other subjects. An especially interesting feature was the display of maps by W. H. Rastall, chief of the industrial machinery division of the Bureau of Foreign and Domestic Commerce. These maps show the concentration of marketing opportunities, by county density, throughout the United States for a number of general lines of products and machinery.

Election of officers of the Associated Machine Tool Dealers for the ensuing year was as follows:

President, William K. Stamets, William K. Stamets Co., Pittsburgh.

Vice-president, Herbert E. Outis, National Supply Co., Toledo.

Secretary, Harry Barney, Barney Machinery Co., Pittsburgh.

Directors, H. A. Smith, H. A. Smith Machinery Co., Syracuse; L. H. Swind, Swind Machinery Co., Philadelphia; John Sauer, Jr., Peninsular Machinery Co., Detroit.

...OBITUARY...

SAMUEL MATHER, one of the nation's outstanding leaders in the iron and steel and iron ore industries, one of the pioneers in the building up of those industries and senior member



SAMUEL MATHER

of the firm of Pickands, Mather & Co., Cleveland, died at his home in Cleveland, Oct. 18. He was Cleveland's first citizen, distinguished civic leader and most generous philanthropist. He had been confined to his home about two weeks, during which he suffered several heart attacks. He was 80 years old.

Mr. Mather descended from a distinguished line of ancestors. He was the eldest son of Stephen Livingston Mather, who went from Connecticut to the Western Reserve district of Ohio. He was born in Cleveland, July 13, 1851. After primary education in the Cleveland schools, he attended St. Mark's School at Southboro, Mass., where he finished his preparatory education in 1869. He planned to enter Harvard University that fall, but an injury caused a change in his plans. In accord with his father's wishes that he gain an experience in the iron ore mining industry in the Lake Superior district, he became a time-keeper in the mines of the Cleveland Iron Mining Co. at Ishpeming, Mich. While there he fell in a mine pit and suffered injuries, from which he did not fully recover for more than two years. During the latter part of his convalescence he spent 18 months in Europe. Returning to Cleveland in 1873, he decided that he was too old to start a college course and entered the business of the Cleveland Iron Mining Co., of which his father was secretary-treasurer and later president. The elder Mather, who had been sent to Cleveland in 1843 to look after some land grants, had become inter-

ested in reports of ore findings in the Lake Superior district, and these led to the formation of the company of which he later became the head. The elder Mather had the distinction of having brought the first boatload of iron ore from the Lake Superior district to Cleveland in 1855.

Samuel Mather remained in the office of his father's company until October, 1881. In that year, after his marriage and return from a European wedding trip, he decided to enter business for himself. During frequent trips that he had made to Michigan mines, Mr. Mather had become acquainted with James Pickands, a Marquette merchant, and Jay C. Morse, then his father's agent at the mines. The three men in 1882 formed a partnership, to engage in iron ore commission business under the present name of Pickands, Mather & Co. Mr. Mather and Col. Pickands were for a time the entire staff. Their first employee was H. C. Dalton, now a member of the firm, who was hired as office boy. William McLauchlan, long a member of the firm, was their first pig iron salesman. The business of the new firm was far from successful the first year, but conditions changed the following year when the opening of the Sault Ste. Marie Canal made possible cheap transportation of ore down the Great Lakes. Mr. Mather gradually broadened his holdings in Lake Superior ore deposits, and the firm under his leadership branched through allied interests into the pig iron, Lake shipping and coal mining industries. As time progressed Mr. Mather also became interested in the steel industry through affiliation with the Youngstown Sheet & Tube Co., the Lackawanna Steel Co., now part of the Bethlehem Steel Corp., and the Federal Furnace Co. and Toledo Furnace Co., now part of the Interlake Iron Corp. He also became interested in the United States Steel Corp. and had been one of its directors since its organization. He became closely identified with various banking interests and served as a director of the Union Trust Co., Cleveland, and other banks.

Mr. Mather for years had given a great deal of his time to various phases of civic betterment work in addition to his liberal contributions to numerous charitable undertakings. He was the moving spirit of the Cleveland Community Fund since its organization several years ago, and the inspiration his leadership gave was regarded as of great value as his large personal contribution. He was deeply interested in Cleveland's Medical Center and Western Reserve University, and in the course of a few years gave several million dollars for the building of Lakeside Hospital and the new School of Medicine building at Western Reserve University.

(Continued on page 1078)

Why Inflation Would Be Dangerous

By DR. LEWIS H. HANEY

Director, New York University Bureau of Business Research

INFLATION is the great danger today.

When you scratch an inflationist, you find a debtor, or a former "new-eraite." Those who imagined business to be fundamentally sound in 1928-1929, and who, therefore, made commitments and went into debt, now want to recoup their losses and lighten their debts by tinkering with the dollar.

Inflationists appeal to the debtors. We are told that mortgagors are unable to pay their indebtedness and that "home owners" are likely to lose their homes. But if, as a result of inflation, a mortgagor delivers 50-cent dollars, is he making payment? And how much of a home owner is one who bought his home on credit?

Inflation is always bad. It means increasing the quantity of money and/or credit above the normal range of business requirements, and thus advancing prices without any change in the supply of commodities or in the wants or fundamental purchasing power of consumers. Inflation causes booms, and booms cause depression.

Tampering with the Almighty Dollar

Inflation causes uncertainty as to the value of money, which strikes at the very heart of business. Fixed obligations remain the same in number of dollars, but each dollar is reduced in value. Inflation causes price changes which produce maladjustments, since prices do not move up together. The great point is that inflation either causes a depreciation in the standard of value, or increases credit without any basis in value produced.

All the world's experience, from the days of John Law to 1929, proves that inflation results in disaster. Even the insidious appeal to adopt inflation or some other "ism" as a temporary remedy for depression is ill-advised. Either inflation will be futile, as the "easy-money policy" of the past year or two has been, or, after a brief spurt, it will plunge us into a worse condition. A renewal of inflation in 1895 resulted in the final crash of 1896.

Available Credit Is Ample

Today our trouble is too much credit in the past, whence loans and investments have become frozen. We do not need more credit; what we need is *better* credit. In 1873 we did not need more money (greenbackism), but, as the event proved, we needed specie payment. In 1893 we did not need more money (bi-metallism); what we needed was better money and the gold standard.

We note the attempts of the inflationists to set up an "alibi" for the bad results of past inflation. This lies at the bottom of their contention that business was sound in 1929. But does anyone in his heart deny that business was fundamentally unsound?

Do we not know that there was an almost unparalleled period of over-spending, over-discounting the future and creation of debts, such that real estate prices, stock market prices and the prices of many commodities were abnormally high in relation to costs?

Do we not know that this condition resulted in over-capitalization, over-capacity in industry and over-production? Is this not evidenced by the accumulation of huge stocks of commodities, not only raw materials, but manufactured products? The index of stocks of manufactured commodities compiled by the Department of Commerce reached a new high level in January, 1929, which has been only once exceeded, temporarily, in October, 1930. Then, when the limit of credit inflation had been reached, buying on credit was checked, and there was revealed a condition in which supplies of all sorts were found so large that they could not be liquidated at the inflated prices which prevailed.

Many of Present Maladjustments Being Corrected

Even today, maladjustments remain; but there is ample and abundant evidence not only that maladjustments have been reduced, but that many have changed in character and become constructive rather than destructive. Bank loans have fallen greatly and are much more normal in relation to deposits. Production has in many cases been brought more nearly into line with shipments, and, while in 1928 stocks of manufactured commodities were piling up, they are now being reduced in most cases.

Above all, we should note that the numerous cases of cheap raw materials and low levels of production, while they may be called *negative* maladjustments, represent potentialities for improvement and normal expansion. The maladjustments which existed in 1928-1929 required recessionary readjustments. The characteristic maladjustments of 1931 represent potentialities for upward readjustments.

Recovery Without Dangerous Nostrums

We note a tendency on the part of the inflationists to say that we face utter ruin unless we inflate. But why be so pessimistic? We have always recovered from the periods of deflation brought on by inflationary booms. Deflation always stops when things get so uniformly cheap that the millions of business men, whose one great object is to make money, are induced to buy. For the long pull, the deflationist is a thousand times more optimistic than is the inflationist. The deflationist believes that we will get well without dangerous stimulants or poisonous drugs. The inflationist is really the one who says we must adopt kill-or-cure measures.

(ESTABLISHED 1855)

Fair Play to Debtor and Creditor

THE depression cult now traces anti-deflationary measures to a conspiracy on the part of debtors to lighten their burdens by "tinkering" with the dollar. We are told that inflation is always bad and that it might lead to a situation where the debtor could make payment in 50 cent dollars. Nothing is said about the opposite condition—the one we are actually facing today—in which debtors are forced to make payment in appreciated dollars. It all depends on whose ox is gored.

But American business adheres to neither the deflationist nor the inflationist school. What it wants is a more stable credit system, so that enterprise will not be thrown out of gear by unearned gains or undeserved losses. It knows that admonitions against tinkering with the dollar, as if it were something of unchanging value, are misleading. Our credit system by its very nature is constantly tinkering with the value of the dollar and in the past has periodically brought us crises of major and minor magnitude. And it is only by further tinkering through the policies of our Federal Reserve System that the maladjustments growing out of credit operations can be offset.

It was primarily for the purpose of providing our banking structure with "elasticity," which essentially means the power alternately to inflate and deflate credit in the interests of stability, that the Federal Reserve act was enacted. American business is aware that Federal Reserve policy failed to prevent stock market inflation and has thus far failed to check the drastic deflation that followed. The unavoidable conclusion is that the powers vested in the Federal Reserve System are inadequate or have not been used to the extent intended.

Certainly the future will see a growing demand for better control of credit, and this of course does not mean an unchanged volume of money funds but one that will grow in step with expansion of population and trade. In the 90's the accident of greatly increased gold production tinkered with the dollar and brought on an inflation which provided the increased credit volume required by the enlarged demands of world commerce. Barring similar future spurts in gold output, central banking policies have the double responsibility of expanding credit in keeping with world needs and protecting it from harmful gyrations.

THE executive council of the American Federation of Labor, President William Green has declared, is in favor of an aggressive plan to restore production and thereby give to labor employment and wages that will make consumption possible. The Fed-

eration puts the cart before the horse; or ignores that a wheelbarrow goes first because a man pushes it. What the executive council should preach is an aggressive plan that will make consumers want to buy (or become able to buy). When that has been done it is certain that production and employment will take care of itself.

Bank Suspensions

BANK suspensions have been one of the serious troubles of these times and led to the setting up of the National Credit Corporation, soon to begin functioning. This will be a great help, but bank suspensions cannot be entirely avoided. There will simply be not nearly so many as otherwise.

It is easy to overestimate the importance of bank suspensions, in the general alinement of things, as suspensions make a deep impression, through fear that depositors will not be paid in full, and a notion that any bank ought to be immune from failure or even suspension. Feeling has been particularly strong because the banking fraternity in general has not stood high in popular esteem. A few comparisons will suggest real relationships.

It may be cynical to remark that it is better to be a depositor in a failed bank and get 70 per cent, losing 30 per cent, than to be in the stock market and get only 30 per cent, losing 70 per cent, but there is something in the observation. Many investors of more than two years ago had as much confidence in their investments as they had in banks. Nothing is entirely safe, but there are wide ranges in degrees of safety or the United States Government would not be able to borrow for short periods at less than one per cent per annum.

Always there are bank suspensions, there being simply a great many more beginning with November of last year

Bank Suspensions

	Number	Deposits
1928	491	\$138,642,000
1929	642	234,532,000
1930	345	864,715,000
1931*	932	698,816,000

*Eight months, including 154 banks with \$226,022,000 in August.

Some banks even reopen—in the first eight months of this year 195 banks with \$68,468,000 deposits; many others pay in full or nearly in full and cannot reopen through losing public confidence.

Total deposits of all banks, exclusive of interbank deposits, were maximum Dec. 31, 1928, at \$56,766 millions, and were at \$51,952 millions June 30 last. Thus deposits in banks suspended in the first eight months of this year represented 1.3 per cent of all de-

posits. That may seem large or small according to the viewpoint. It does not seem so large from the viewpoint that one does not have money in bank chiefly for safe keeping but rather for the purpose of having it handled, the depositor drawing checks.

There is no close measure of the mobility of deposits as a whole for the reason that there are such enormous exchanges in New York City. Last July bank debits were \$21,007 millions in New York City and \$18,444 millions outside, making \$39,451 millions as the total. One might take \$20,000 millions as fairly typifying the movement for the purpose of comparing with total deposits, whereby two-fifths of the deposits would be turned over every month. As a matter of fact many concerns turn over in a week or two more than their average deposit.

The foregoing is presented to furnish an idea of the proportion of things, not as a defense of bankers individually or collectively. Nearly everyone feels that bankers ought to have known more in 1928 and 1929 than they did as indicated by recent developments. Bank suspensions may not be so big a trouble as one would assume without quantitative comparisons, but there is a much bigger trouble resulting from the lack of foresight, the fact that the bankers are unwilling or unable to extend to business the credit it needs and to which, according to common appraisal of our banking system, it is entitled.

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Chain Stores

THE chain stores are going to be increasingly a subject of political and social discussion. Shall they be handicapped by special taxation or shall they be unmolested? There is no question of their beneficence to the public in the matters of first-class quality of goods and low prices. There are, however, some persons who have grievances against them, and when there is a new plum tree to be shaken for taxes politicians naturally are all for doing it.

We are acquainted with a small town that has two stores. One is the crossroads store of old fashion, unattractive and rather dirty. The other is a unit of a great chain smartly kept up. There is no controversy in this little town. The people who can pay cash go to the chain unit and buy cheaply. Those who want to buy on credit go to the old store and pay dearly. The methods of its proprietor are inefficient and he has carrying charges and more or less of bad debts.

Both of these establishments serve the community, but in different ways. The old system will probably never become extinct for there will always be many persons who will like the kind of service it renders and be willing to pay for it.

However, the recent finding of the Census that in 1929 there were in the United States 1,549,167 retail stores of all kinds (including restaurants and gasoline filling stations) serving a population of about 123 million indicates the need for further economy in this direction, notwithstanding the headway that the chains, department stores and mail order houses had made. Also suggestive is the esti-

mate of Dr. F. W. Ryan, vice-president of the National Credit Association, that the open account indebtedness of the public to retailers runs to a total of 4.5 billion dollars, which may be compared with the 50 billion dollar total volume of trade done by retailers.

Whatever be the case against the chain stores the idea of one of our socialistic senators, that after extinguishing all individual dealers they will then combine into one great trust and mule the public, attains the acme of absurdity. A brain that can think of such a thing must have strange convolutions.

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Americans Will Not Be Stampeded

IT must be conceded that neither inflation nor deflation policies as such have more than an academic interest at the present time to those directing Federal Reserve policies. Their present problem is one of adaptation to the circumstances created by domestic hoarding and foreign withdrawals. The monetary gold stocks of this country have been reduced by \$656,634,000 since Great Britain went off the gold standard, but we still have a reserve of \$4,400,000,000, or 40 per cent of the world's supply, and can stand a further loss of two billions, it is estimated, without endangering the dollar.

Gold exports, of course, are traceable to propaganda against the dollar on the Continent. A large part of the gold shipped abroad has gone to France and now we learn that the Bank of France proposes to withdraw an additional \$600,000,000 in short-term balances unless a higher rate of interest is paid.

There is nothing to fear from this move, should it actually eventuate, if Americans retain their composure and good sense. The Federal Reserve System can easily meet the test of foreign withdrawals, if not too severely handicapped by domestic hoarding. While it is easier to exhort against hoarding than to stop it, it should be evident to every one that there are still ways of obtaining safety for one's funds without taking them out of circulation. Purchases of Government bonds, for example, would satisfy all possible requirements of security and at the same time would add immobilized funds to the nation's credit base. Such purchases would serve as patriotic a purpose as the buying of Liberty Bonds did during the World War, for this country is now under attack. The fact that the assault is against our monetary system does not make it any less real.

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Perils of "Seasonal Adjustment"

BUSINESS men are studying statistics of trade movements more than ever before, and are giving more attention than formerly to the short-range swings, for they have the big question before them of "rounding the turn." Continually they see tables and charts with an inscription "adjusted for seasonal variation," but rarely is there any reference to the manner of this "adjustment." Why? It would be inane to

fancy that seasonal variations are such well established, such regular, things that explanation need not be given.

In not a single important thing made the subject of such presentations has there been uniform "seasonal variation" year by year. Accordingly, it makes a difference what years are selected for compiling the monthly or weekly averages. To select a large number of years with the idea of smoothing out individual irregularities will not do, for that carries one back to old years when circumstances may have been quite different.

For instance, some years ago there was a swing from open to closed automobiles. In that period there was, on the eve of winter, a disposition to sell the open car and buy a closed car. Now the tendency when selling a closed car and buying a nice new shiny one is to do it when the good weather, not the bad weather, is at hand. That makes a difference in "seasonal" variations in automobile demand.

In the case of steel ingot production, now viewed with so much interest everywhere, hardly a single series of years would show the same monthly variation as any other series of years. Every successive five-year period would be different, and so would three, four or five-year periods beginning or ending with the same year. The differences in seasonal

swings, one year with another, have been particularly great. Even freight car loadings, which are very comprehensive from their subject matter, by no means show the same seasonal variations year after year.

There is a double peril in taking too much stock in these presentations "adjusted for seasonal variation." In the first place, people are watching things so closely, feeling that a straw may show how the wind has swung about, that too much may be made of a small turn, one that in ordinary times would be ignored. In active times, would a 2 per cent decrease in something arouse as much emotion as would a 2 per cent increase today?

In the second place, if seasonal variations had been regular and well established in the good times of the past, it does not follow that the same variations would occur in these times. Seasonal variation might now be greater or it might be less. In freight car loadings one has reason to think the variation now would be less than usual, for some commodities that enter into the life of the people day by day throughout the year are off less than some other things. They thus tend to lessen the usual seasonal variation.

By all means the statistics should be studied, but too much reliance should not be placed on the short-range changes, particularly where they are designated as "adjusted for seasonal variation."

CORRESPONDENCE

Porosity in Light Electric Steel Castings

To the Editor: I read with much interest the discussion in THE IRON AGE of Sept. 24, "Proper Sand Control and the Low-Ductility Problem," and if I may be permitted, I would like to add a few of my experiences along this line, in the hope that this is not going to increase the general disagreement in the matter.

Just why electric steel is more susceptible to porosity than either converter or open-hearth steel, I do not know. Perhaps the tremendous heat in connection with atmospheric conditions direct under the electric arc, or else certain actions of the slag on the metal might be the cause of it. But I do know that steel made by the latter two processes requires no aluminum additions, either to the ladle or shank; on the other hand, most all electric furnace operators do use aluminum. Some are throwing it in the ladle during tapping of the heat, others are adding it to shanks and still others—very wrongly—are inserting aluminum in the gate, while pouring the mold.

In connection with converter steel I used aluminum only in cases where the heat seemed somewhat off, indicated by sparkling in heads and gate. Although this addition of aluminum made the sparkling cease, pin holes in castings of such a heat were apparent just the same; the aluminum did not help much. With few exceptions all molds were made in green sand.

When it comes to shanking acid open-hearth steel (6 to 8 tons) I did use some aluminum, but the ductility was normal and pin holes have seldom troubled me.

Then came the electric furnace and with it plenty of pin holes and test bar failures. Any steel foundry man

that had the opportunity to switch from converter to electric furnace process will agree with me that molds which were suitable for converter steel became unsatisfactory for electric steel. While it mattered little how hard the mold was rammed for converter practice, when changed to electric, not only had the ramming to be softer, but considerable venting of both cope and drag had to be introduced if pin holes, also blowholes, were to be avoided.

A number of test bars, which I made to ascertain the quantity of aluminum that can be added to the electric steel without detrimental effects to ductility, indicated that 12 ounces per ton seemed the maximum.

It depends on the gas conditions of the steel whether it will oxidize all of the aluminum to alumina or part only and the balance would form ferro-aluminum, which, being very brittle, might influence the ductility.

Another experience I had with test bars would indicate that porosity in steel is not always responsible for low ductility. I had quite a number of bars that showed pin holes on one or both ends but were sound at the 0.505 in. diameter. These bars pulled very nicely and had elongations of not less than 26 per cent with reductions of area of about 45 per cent.

JOHN SONNENFELD,

Reading, Pa.

Old Fashioned Serving Trays

To the Editor: Please tell me by whom, in this country or abroad, the old fashioned serving tray which was decorated with fruits, flowers and various scenes is still made. We believe these trays were made of the old fashioned charcoal iron and are more or less sought after by collectors. We wish to obtain the unpainted trays.

J. H. BAWDEN,

J. H. Bawden & Co.

Freehold, N. J.

(Concluded from page 1051)

[illegible]

To maintain close supervision over the progress of orders in process, the company has 3 x 5 in. "tickler" cards on file in the office which come up

Arrangement of the shop facilitates production and likewise takes into consideration the best possible working conditions for employees. In the main plant work benches are placed next to windows with machinery occupying the center of the room. Each tool and die maker has a surface plate which rests on a portable stand so that it can be moved about conveniently. The benches line three sides of the room, the fourth having 3-ton overhead cranes serving the heavier machine tools nearby. The office and main engineering department are located on the second floor of the main building. A private alley separates the main building from the smaller adjoining structure, the first floor of which is used for rough-grinding castings, painting machine bases and storing patterns. The second floor serves as a large engineering department available for concentration on sizable tool and die programs.

(Concluded from page 1053)

amplifying the minute current from photo-electric cells. In the first and most simple system we have the vacuum tube which may be used to operate small relays or graphic recording instruments. The second system involves both the ordinary vacuum tube and the thyatron as well, while the third system permits a continuously variable output from the thyatron depending upon the degree of illumination striking the cathode of the photo-cell. In this way, even

TO maintain close supervision over the progress of orders in process, the company has small "tickler cards" in the office which come up for action daily.

[illegible]

small-fractional horsepower motors may be operated from the output of the thyatron.

In addition to the vacuum and gas-filled photo-tubes previously mentioned, there is a third type, sometimes referred to as the photo-voltaic cell, which has recently found many applications. It is distinguished by the fact that it contains an electrolyte and that it requires no polarizing battery. It is in itself a battery, the current from which is increased when light strikes one of its active plates. This is made possible by a small glass window. The current developed by such cells is very high when compared to the output of vacuum or gas type photo-tubes, although its general action for many purposes is not satisfactory. Its color sensitivity for one thing is very weak, which makes it practically impossible to apply it in measuring the condition of surfaces.

In a second article, the writer will show how photo-electric tubes of various types are employed for taking mechanical measurements, for automatic counting, sorting according to size, color and shape, and for starting and stopping machinery. Various types of amplifying circuits used will be discussed also.

OBITUARY

(Continued from page 1072)

He was a trustee of Kenyon College, Gambier, Ohio, and gave much toward the endowment of that institution. He was a member of the American Institute of Mining and Metallurgical Engineers, American Iron and Steel Institute, a director of the Cleveland Museum of Art and of Case Library, Cleveland, and affiliated with numerous other Cleveland and national organizations, either as a director, trustee or member.

Mr. Mather is survived by two sons, S. Livingston Mather, vice-president, Cleveland Cliffs Iron Co., and Philip R. Mather, one sister and a brother, William G. Mather, president, Cleveland Cliffs Iron Co.

♦ ♦ ♦

DR. SAMUEL W. STRATTON, chairman of the Corporation of the Massachusetts Institute of Technology, died suddenly on Oct. 18, at his home in Back Bay, Boston. Born on a farm in Illinois, in 1861, Dr. Stratton worked his way through the University of Illinois, having received the degree of B.Sc. in engineering in 1884. He then became an instructor at his alma mater, finally organizing a department of electrical engineering and was its first head. In 1889, he became professor of physics and electrical engineering. Four years later, Dr. Stratton went to the University of Chicago and became a professor of

that institution in 1898. It was while in this capacity that he conceived the need for standardization and research for American industry, which led to the establishment of the United States Bureau of Standards. Through the aid of Lyman J. Gage, then Secretary of the Treasury, a bill setting up the bureau was put through Congress in 1901, and Dr. Stratton was made its first head, retaining this position for 21 years. In 1923, Dr. Stratton was called to the presidency of the Massachusetts Institute of Technology, having filled this office until 1930, when he became chairman of the corporation.

♦ ♦ ♦

LOUIS COURTNEY CORBUS, for 25 years purchasing agent of the Standard Sanitary Mfg. Co., Pittsburgh, in which capacity he had become one of the most widely and favorably known purchasing executives in the country, died suddenly on Oct. 14, after a brief attack of bronchial pneumonia. He was born in Allegheny, Pa., now North Side, Pittsburgh, in 1875 and attended Geneva College, Beaver Falls, Pa. He began his business career with the Eclipse Bicycle Co., Beaver Falls, and later served the same organization at Elmira, N. Y. He was then employed in the purchasing department of the American Bridge Co., Pittsburgh, where he remained until July, 1907. At that time he was appointed assistant purchasing agent for the Standard Sanitary company, having been promoted to the position of purchasing agent a short time later.

♦ ♦ ♦

ALBERT JEFFERSON SAYERS, head of the coal tipple and coal washery department of Link-Belt Co., Chicago, died at his home in that city on Oct. 11, aged 61 years. He was born at Troy, Ohio, and was graduated from the University of Illinois in 1895. He had been affiliated with Link-Belt Co. for 32 years and had become a leading factor in mechanical handling, screen-

ing and washing of coal. He was a member of the American Society of Mechanical Engineers and of the manufacturers division of the American Mining Congress.

♦ ♦ ♦

LEWIS FOULKE SHOEMAKER, president and treasurer of the Shoemaker Bridge Co., Pottstown, Pa., died Oct. 15, in his sixty-fifth year, at his home in Devon, Pa. After attending the Friends Central School in Philadelphia, he entered the hardware business in that city with his father. Some years later he joined the sales force of the Carnegie Steel Co., and in 1896 started the Lewis F. Shoemaker Co., steel erectors, in partnership with Thomas B. Satterthwaite. In 1902 the company acquired its own fabricating shop in Pottstown, Pa., and in 1904 was incorporated as Lewis F. Shoemaker & Co. In 1919 the name was changed to Shoemaker-Satterthwaite Bridge Co. and in 1923 the present name was adopted, Mr. Satterthwaite continuing as secretary of the company.

♦ ♦ ♦

LOUIS SCHLESINGER, prominent Milwaukee industrialist, died of heart disease Oct. 11, aged 75 years. He was best known for his development and introduction of the tabulator into the business world, in association with the Remington Typewriter Co. His latest project was the establishment of the Bradley Washfountain Co., Milwaukee, maker of combination sanitary fixtures for industrial plants and schools.

♦ ♦ ♦

T. H. MAYTAG, whose death was recorded in this column last week, was not the president and treasurer of the Maytag Co., Newton Iowa, but the uncle of that official, E. H. MAYTAG. Accordingly THE IRON AGE owns regretfully to a grievous error in getting the facts mixed, and wishes many years of useful leadership to President E. H. Maytag.



DR. S. W. STRATTON



L. C. CORBUS



A. J. SAYERS

MARKETS



Freight Rate Advance Affects Iron, Steel and Raw Materials

▲ ▲ ▲
DECISION of Interstate
Commerce Commission
Comes as Steel Demands Begin
to Broaden in Some Lines.
▼ ▼ ▼

THE Interstate Commerce Commission's decision, announced late Tuesday, permitting limited freight rate increases on certain commodities, including steel, pig iron, scrap, machinery, iron ore, coal and coke overshadows in importance other developments in the metal-working industries this week.

Proposed increases are 2c. per 100 lb. on steel, \$6 per car on pig iron and scrap, \$3 on iron ore, coal and coke and \$10 on machinery and other metal products. Whether these advances are sufficient to influence buyers generally to abandon their extreme caution and lay in some stocks before the new rates take effect, and whether the railroads themselves will become more liberal in their steel and equipment orders are questions that cannot be answered at this early date, but it is expected that some business stimulation will result. New tariffs must be filed by Dec. 1, and rates would run until March 31, 1933.

The denial by the commerce commission of the 15 per cent horizontal increase requested by the carriers again suggests that wage cuts may be asked for, unless the railroad brotherhoods volunteer to accept reductions.

THERE are scattered indications of a slight broadening in demands for steel, coupled with reports of visible improvement in the business of some metal-working manufacturers, but the aggregate of these new requirements is not sufficient to offset the small demands from lines that normally account for the heaviest consumption of steel. Consequently steel ingot production is still lower this week at 28 per cent of capacity. The falling off is partly accounted for by completion of pipe orders and a slackening of tin plate output.

While caution still marks the attitude of automobile manufacturers, their steel purchases are gradually expanding. Automobile output probably will gain some in November and still more in December as new models are produced. Farm equipment builders are

resuming production on a moderate scale, and more railroad business is appearing.

The Santa Fe is inquiring for 40,000 tons of rails and the necessary accessories, while the Chesapeake & Ohio will buy a tonnage of track accessories. The Boston & Maine has ordered 10,000 tons of rails from Bethlehem. Equipment orders include 700 gondola cars for the Chicago & Illinois Midland and 500 subway cars for New York City. Some railroads are calling men back to their shops.

ON top of these slightly favorable developments is the decision of the Illinois Supreme Court declaring invalid the prevailing rate of wage law; this will release upward of \$50,000,000 worth of building and road work. Meanwhile, construction activities seem to have been checked momentarily, structural steel awards amounting only to 15,000 tons, with new projects in about the same amount. Lettings of reinforcing bars, however, were large at 15,600 tons.

Thawing of credits through the operations of the National Credit Corp. is counted upon to produce favorable results in business, and sentiment in many important quarters is now the most hopeful in many months.

IN the main the finished steel price situation is holding well, although some concessions have appeared, particularly on cold-rolled strip steel at Detroit and on bars, shapes and plates at Chicago. Weakness in raw materials is more pronounced, foundry and basic pig iron having declined 50c. a ton in the Valleys and at Pittsburgh, and there have been further dips in scrap prices in several centers. THE IRON AGE composite prices for pig iron and steel scrap have reached new lows, the former at \$15.17 a gross ton, compared with \$15.34 a week ago, and the latter at \$8.75 a ton, against \$8.83 last week. Finished steel is unchanged at 2.116c. a lb.

PITTSBURGH

Improvement Expected in Buying by
Automobile Industry and Railroads

PITTSBURGH, Oct. 20.—While evidences of improved activity in the local steel industry are still scant, limited gains in releases on sheets and strip steel from the automobile industry are reported and orders for cold-finished and alloy steel bars are a little heavier. The automobile industry continues to be regarded as the most likely of the large consuming groups to bring improvement next month, but now that the freight rate decision has been announced gains are also expected from the railroads, as well as the farm implement manufacturers.

If such orders materialize and general demand for steel in small lots continues to hold up, it is not unlikely that November will run somewhat ahead of October in production and that the usual year-end slump in activity will be less pronounced than usual. With the prospect of a seasonal upturn in January almost certain, sentiment in this district is still rather favorable.

Buying by the railroads is gradually getting under way, and repair work looms as a large item. One road is expected to place orders for about 11,000 tons of accessories in the week. Production of railroad materials has not yet increased in this district.

Completion of recent line pipe orders in the Valleys and at Pittsburgh has resulted in lower output of tubular goods. Further line pipe buying is possible, but not expected by most companies. Standard pipe fails to show much improvement.

Steel ingot operation in the Pittsburgh district is holding its own at approximately 25 per cent of capacity. It is significant that none of the larger interests is varying its output more than two points from this figure. While two steel works blast furnaces have gone in since the first of the month, raising the active number to 11, the changes have been the result of adjustments of pig iron output to the present rate of steel production rather than to any increase in demand. However, steel company stocks of pig iron have been liquidated to some extent during the last two or three months and accumulation has practically ceased. Ingot production in the Wheeling district continues to average about 40 per cent, although the rate of one maker varies sharply from week to week. In the Valleys, independent steel company open-hearth activity has fallen under 20 per cent, and the schedules of the leading interest at its two active plants are not sufficient to bring the

Steel ingot production is no higher, but orders for some steel products have gained slightly.

* * *

Automobile industry and railroads expected to buy a little more freely soon.

* * *

Seasonal upturn by January is seen by steel companies.

* * *

Foundry and basic grades of pig iron are down 50c. a ton.

* * *

Weakness apparent in scrap market, though heavy melting steel is unchanged.

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average for the district to more than 20 per cent.

Steel prices have been subject to more severe test in recent weeks, but have held fairly well. Cold-rolled strip alone shows marked tendency toward weakness in the Detroit territory.

PIG IRON

In the face of continued dull demand and more frequent price concessions on small tonnages, the market on foundry and basic pig iron in the Valleys and at Pittsburgh is quotable 50c. lower. The revision represents no marked change in conditions and to some extent is a recognition of the competition of Lake Erie furnaces, particularly in northeastern Ohio. While the market on basic iron is largely governed by conditions of the moment, one or two rather recent sales have been at a level which necessitates a downward revision in the nominal quotations. Large tonnages have brought out lower figures. Carload lots are quoted at levels above the quoted market by some makers. Shipments of pig iron in general are holding at recent levels, and new buying is confined to immediate needs.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$15.00
Bessemer	17.00
Gray forge	16.00
No. 2 foundry	16.50
No. 3 foundry	16.00
Malleable	17.00
Low phos., copper free	\$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$15.50 to \$16.00
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

SEMI-FINISHED STEEL

Shipments are at a minimum, and no new buying is reported. Prices on billets, slabs and sheet bars continue nominal at \$29, Pittsburgh or Youngstown, while forging billets are holding at \$35. Wire rods are quiet, and are further depressed by the light activity of the bolt and nut makers.

RAILS AND TRACK ACCESSORIES

The Chesapeake & Ohio took bids last week on 11,000 tons of accessories, and is expected to place this business in the next few days. The local mill has not begun rolling against this road's recent rail order, but other suppliers are said to have got under way on this tonnage. The Boston & Maine has closed with Bethlehem for its 1932 rail requirements, 10,000 tons. Current specifications for both rails and track accessories are very light.

BOLTS, NUTS AND RIVETS

Little change in the character of demand is reported, and price weakness persists on bolts. The larger makers are said to be withdrawing some of the recent large discounts which they have offered, and some effort is being made to stabilize the market. Large rivets are unchanged at \$2.25 per 100 lb., and small rivets are holding at 70, 10 and 5 per cent off list.

BARS, PLATES AND SHAPES

Recent buying by the automobile industry has affected flat-rolled products more favorably than bars, although a little tonnage from that source is reaching local mills. Otherwise, general demand for heavy hot-rolled products is just about holding its own, with releases against structural and reinforcing bar contracts making up a considerable part of the total. However, no new awards are reported in the immediate Pittsburgh territory. Bids are to be taken this week on 5000 tons of shapes for the Supreme Court building in Washington. A local fabricator has booked 1000 tons of structural material for a bridge at Evansville, Ind. The barge market continues hopeful, a local company having placed 12 barges, requiring 1800 tons of plates and shapes. Otherwise, inquiry is rather indefinite, although plans are still under way for a considerable number of barges which will come out early in the spring, if they are not placed this fall.

Prices are holding fairly well on the general run of business, although

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Oct. 20, 1931	Oct. 13, 1931	Sept. 22, 1931	Oct. 21, 1930
No. 2 fdy., Philadelphia.....	\$16.26	\$16.26	\$16.26	\$18.76
No. 2, Valley furnace.....	16.50	17.00	17.00	17.00
No. 2, Southern, Cincinnati.....	14.69	14.69	14.69	15.19
No. 2, Birmingham.....	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago.....	17.00	17.00	17.50	17.50
Basic, del'd eastern Pa.	16.75	16.75	16.75	17.75
Basic, Valley furnace.....	15.00	15.50	15.50	17.00
Valley Bessemer, del'd P'gh.....	18.76	18.76	18.76	19.26
Malleable, Chicago.....	17.00	17.00	17.50	17.50
Malleable, Valley.....	17.00	17.00	17.00	17.50
L. S. charcoal, Chicago.....	25.04	25.04	25.04	27.04
Ferromanganese, seab'd car- lots.....	\$85.00	\$85.00	\$85.00	94.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc., Per Gross Ton:	Oct. 20, 1931	Oct. 13, 1931	Sept. 22, 1931	Oct. 21, 1930
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	34.00	34.00	34.00	36.00
Re-rolling billets, Pittsburgh.....	29.00	29.00	29.00	31.00
Sheet bars, Pittsburgh.....	29.00	29.00	29.00	31.00
Slabs, Pittsburgh.....	29.00	29.00	29.00	31.00
Forging billets, Pittsburgh.....	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.60	1.60	1.60	1.60

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.93	1.93	1.93	1.93
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.88	1.88	1.88	1.88
Structural shapes, Pittsburgh.....	1.60	1.60	1.60	1.60
Structural shapes, Chicago.....	1.70	1.70	1.70	1.70
Structural shapes, New York.....	1.85 1/2	1.85 1/2	1.85 1/2	1.85 1/2
Cold-finished bars, Pittsburgh.....	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh.....	1.55	1.55	1.55	1.60
Cold-rolled strips, Pittsburgh.....	2.15	2.15	2.15	2.35

Finished Steel, Per Lb. to Large Buyers:	Oct. 20, 1931	Oct. 13, 1931	Sept. 22, 1931	Oct. 21, 1930
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill.....	2.50	2.50	2.50	2.55
Sheets, galv., No. 24, P'gh.....	2.90	2.90	2.90	3.00
Sheets, galv., No. 24, Chicago dist. mill.....	3.00	3.00	3.00	3.10
Hot-rolled sheets, No. 10, Pittsburgh.....	1.70	1.70	1.70	1.70
Hot-rolled sheets, No. 10, Chicago dist. mill.....	1.80	1.80	1.80	1.80
Wire nails, Pittsburgh.....	1.90	1.90	1.90	2.00
Wire nails, Chicago dist. mill.....	1.95	1.95	1.95	2.05
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill.....	2.25	2.25	2.25	2.35
Barbed wire, galv., P'gh.....	2.55	2.55	2.55	2.70
Barbed wire, galv., Chicago dist. mill.....	2.60	2.60	2.60	2.85
Tin plate, 100-lb. box, P'gh.....	\$4.75	\$4.75	\$5.00	\$5.00

Old Material, Per Gross Ton:	Oct. 20, 1931	Oct. 13, 1931	Sept. 22, 1931	Oct. 21, 1930
Heavy melting steel, P'gh.....	\$10.25	\$10.25	\$10.75	\$14.50
Heavy melting steel, Phila.....	8.00	8.25	8.50	12.50
Heavy melting steel, Chgo.....	8.00	8.00	8.25	11.00
Car wheels, Chicago.....	9.00	9.50	9.50	13.00
Car wheels, Philadelphia.....	12.00	12.00	12.00	15.00
No. 1 cast, Pittsburgh.....	10.00	10.00	10.50	13.25
No. 1 cast, Philadelphia.....	11.50	11.50	11.50	12.00
No. 1 cast, Chgo (net ton).....	8.50	8.50	8.50	10.50
No. 1 RR. wrot., Phila.....	10.00	10.00	10.00	15.00
No. 1 RR. wrot., Chgo (net).....	6.50	7.00	7.00	9.25

Coke, Connellsville, Per Net Ton at Oven:	Oct. 20, 1931	Oct. 13, 1931	Sept. 22, 1931	Oct. 21, 1930
Furnace coke, prompt.....	\$2.40	\$2.40	\$2.40	\$2.60
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	7.37 1/2	7.37 1/2	7.37 1/2	10.12 1/2
Electrolytic copper, refinery.....	6.75	6.75	6.75	9.75
Tin (Strait), New York.....	23.00	23.12 1/2	23.37 1/2	27.12 1/2
Zinc, East St. Louis.....	3.30	3.45	3.70	4.00
Zinc, New York.....	3.65	3.80	4.05	4.35
Lead, St. Louis.....	3.52 1/2	3.82 1/2	4.22 1/2	4.95
Lead, New York.....	3.75	4.00	4.40	5.10
Antimony (Asiatic), N. Y.....	6.50	6.50	6.50	7.37 1/2

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

sharp concessions on desirable structural steel and reinforcing bar contracts are still available.

COLD FINISHED STEEL BARS

Specifications are light, but new orders this month are running considerably ahead of those of September. The price is holding fairly well at 2.10c., Pittsburgh.

WIRE PRODUCTS

Demand for merchant wire products, including barbed wire and fencing, is still running considerably ahead of tonnage going to manufacturers. While an early improvement in the requirements of the automobile industry is expected, little change has been noticed to date. The price situation on wire products in general reflects considerable strength, and low-priced nail business has been virtually eliminated. Some jobbers have already begun to specify against new contracts taken at the beginning of

the quarter at \$1.90, and this would indicate that low-priced tonnage is largely out of the way. Manufacturers' wire is holding at 2.20c., Pittsburgh.

TUBULAR GOODS

Production of electric weld and seamless line pipe has declined because of the completion of most of the larger orders placed earlier in the summer. No new tonnage has been booked, and pipe output as a whole is somewhat lower than it has been recently. Demand for butt-weld material seems to be running a little ahead of that of September, but is still far below expectations for this time of the year. No change in the movement of oil country goods is reported.

SHEETS

While heavier releases for sheet steel are not general with all companies, some producers have had a

considerable gain in the last two weeks, and production is scheduled to rise slightly before the end of the month. Specifications from the automobile body builders have been particularly encouraging, and other consumers serving the motor car industry are preparing to increase their orders. The improved demand from other sources reported last week has also been fairly well maintained, and miscellaneous consumers are taking their usual quotas. Operations are off slightly at some mills, but the decline is a reflection of higher production in the previous week and the loss may be more than wiped out in the next few days. Almost all the tonnage coming in is for immediate shipment, and production may vary sharply from day to day. Current operations are at about 30 per cent of capacity.

Prices on sheets generally are well held in most territories, and reports of concessions in the Detroit district are difficult to prove. Several large

THE IRON AGE COMPOSITE PRICES

Finished Steel		Pig Iron	Steel Scrap
Oct. 20, 1931	2.116c. a Lb.	\$15.17 a Gross Ton	\$8.75 a Gross Ton
One week ago	2.116c.	15.34	8.83
One month ago	2.116c.	15.42	9.17
One year ago	2.135c.	16.29	12.67
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.		Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	
Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.			
High Low		High Low	High Low
1931.....	2.142c., Jan. 13: 2.102c., June 2	\$15.90, Jan. 6: \$15.17, Oct. 20	\$11.33, Jan. 6: \$8.75, Oct. 20
1930.....	2.362c., Jan. 7: 2.121c., Dec. 9	18.21, Jan. 7: 15.90, Dec. 16	15.00, Feb. 18: 11.25, Dec. 9
1929.....	2.412c., April 2: 2.362c., Oct. 29	18.71, May 14: 18.21, Dec. 17	17.58, Jan. 29: 14.08, Dec. 3
1928.....	2.391c., Dec. 11: 2.314c., Jan. 3	18.59, Nov. 27: 17.04, July 24	16.50, Dec. 31: 13.08, Nov. 22
1927.....	2.453c., Jan. 4: 2.293c., Oct. 25	19.71, Jan. 4: 17.54, Nov. 1	15.25, Jan. 11: 13.08, Nov. 22
1926.....	2.453c., Jan. 5: 2.403c., May 18	21.54, Jan. 5: 19.46, July 13	17.25, Jan. 5: 14.00, June 1
1925.....	2.560c., Jan. 6: 2.396c., Aug. 18	22.50, Jan. 13: 18.96, July 7	20.83, Jan. 13: 15.08, May 5

users are paying the full price of 3.10c., Pittsburgh, on auto body sheets, and 2.40c. on No. 24 gage hot-rolled annealed.

TIN PLATE

Many of the larger consumers have now renewed their buying contracts for the first half of next year, and some releases on anticipated tonnage for early rolling have been obtained. However, mills are still producing only for current needs and will not likely begin on next year's requirements until definitely forced to by the prospect of irregular production schedules in the near future. The tin plate price of \$4.75 a base box, Pittsburgh, is fairly well established.

WAREHOUSE BUSINESS

The volume of steel sales out of warehouse shows little change, but orders have been more numerous in the last week or two. Prices have not changed materially except on bolts, nuts and rivets, which are lower. Bolts and nuts are now quoted at 73 and 10 per cent off list, while large rivets have declined to \$3 a 100 lb. Wire nails are stronger, reflecting the stiffening of mill prices.

COKE AND COAL

Coal production has reflected seasonal improvement in industrial demand, and dealers are taking out increasingly large tonnages. Slack is very weak, with prices as low as 30c. a ton in evidence. The coke market is dull, although a New York State furnace recently placed a tonnage with a Pittsburgh district seller.

STRIP STEEL

A little more activity is indicated by local producers, and production schedules have been stepped up slightly at a few mills. New orders are also more encouraging, but most of the improvement is accounted for by the automobile industry alone. General demand continues very dull. Prices on hot-rolled strip are generally maintained at 1.55c., Pittsburgh,

for material wider than 6 in., and 1.65c. on the narrow sizes. On cold-rolled strip some price discrepancies have appeared in the Detroit territory, and mills are watching the situation closely in order to protect themselves against the loss of tonnage. The larger companies have not planned any formal reduction in asking prices, and are not expected to do so unless competition forces them into it.

OLD MATERIAL

No marked change in the level of scrap quotations has been noticeable in the last week. Although the market has a rather weak tone, and hydraulic compressed sheets are lower, one user was able to buy this grade at \$9.75, and a distress tonnage of No. 1 heavy melting steel is reported to

have gone to a nearby plant at a price which probably could not be duplicated on a substantial tonnage. One consumer of open-hearth scrap has lifted its hold-up in a limited way, bringing about a somewhat freer movement in the district. However, only one outlet for blast furnace scrap is open, and the market is weak in spite of rather recent buying. Specialties are dull, with foundry operations continuing at a low ebb.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:

No. 1 heavy melting steel...	\$10.00 to \$10.50
No. 2 heavy melting steel...	9.00 to 9.50
Scrap rails	10.00 to 10.50
Compressed sheet steel...	9.50 to 10.00
Bundled sheets, sides and ends	9.00 to 9.50
Cast iron carwheels	10.50 to 11.00
Sheet bar crops, ordinary...	11.00 to 11.50
Heavy breakable cast....	8.00 to 8.50
No. 2 railroad wrought...	10.00 to 10.50
Hvy. steel axle turnings...	9.00 to 9.50
Machine shop turnings...	7.00 to 7.50

Acid Open-Hearth Grades:

Railr. knuckles and couplers	11.50 to 12.00
Railr. coil and leaf springs	11.50 to 12.00
Rolled steel wheels.....	11.50 to 12.00
Low phos. billet and bloom ends	13.50 to 14.00
Low phos. mill plates....	12.00 to 12.50
Low phos. light grades....	12.00 to 12.50
Low phos. sheet bar crops	13.00 to 13.50
Heavy steel axle turnings...	9.00 to 9.50

Electric Furnace Grades:

Low phos. punchings.....	12.50 to 13.00
Heavy steel axle turnings...	9.00 to 9.50

Blast Furnace Grades:

Short shoveling steel turnings	7.25 to 7.75
Short mixed borings and turnings	7.25 to 7.75
Cast iron borings.....	7.25 to 7.75

Rolling Mill Grades:

Steel car axles.....	15.50 to 16.50
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Cupola Grades:

No. 1 cast.....	9.50 to 10.50
Rails 3 ft. and under....	12.00 to 12.50



The Wabash Avenue Bridge, Chicago, was decorated Oct. 21 by the American Institute of Steel Construction with a bronze tablet as the most beautiful steel span built during the last year. The presentation was made by W. M. Wood, president of the Mississippi Valley Structural Steel Co., on behalf of the institute.

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes...	2.60c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.10c.
Squares and flats.....	3.60c.
Bands	2.95c.
Hoops	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles.....	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count, 73 and 10 per cent off list	
Machine bolts, 100 count, 73 and 10 per cent off list	
Carriage bolts, 100 count, 73 and 10 per cent off list	
Nuts, all styles, 100 count, 73 and 10 per cent off list	
Large rivets, base per 100 lb.	\$3.00
Wire, black, soft ann'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg.....	\$2.95 to 2.15
Cement coated nails, per keg.....	2.05 to 2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO Steel Operations Decline in Face of Somewhat Improved Prospects

CHICAGO, Oct. 20.—The Chicago steel market is as spotty as it has been at any time this year. Ingot output has given further ground and now cannot be measured above 25 per cent of capacity, or even a shade less. New business remains sluggish in spite of the fact that some rail tonnage is included in recent bookings. Specifications show some improvement, but not of a character to indicate a trend away from a dull market. The situation is well illustrated by the fact that various bar mill units are operating at rates that vary all the way from 18 per cent to as high as 50 per cent of capacity. A troublesome factor in mill operations is the size of individual orders. Some heavy mills are changing rolls after runs as small as 100 tons to 150 tons.

On the more encouraging side of the market are the placing of 7000 tons for a recent car order and the Santa Fe inquiry for 40,000 tons of rails and 12,000 tons of accessories. Also several Western railroads have started to call men back to their stations in shops, and several farm implement manufacturers have resumed production on a moderate scale. Demand for structural steel has turned sharply to the point where both awards and inquiries are almost all in the class of 500 tons or less each. Pipe fabricators and tank shops are faring no better in this respect.

It is estimated that a large part of the \$54,000,000 Illinois State construction program will go forward, now that the Supreme Court has held invalid the prevailing rate of wage scale law passed by the last legislature.

PIG IRON

Shipments of northern foundry iron from local furnaces are running 40 per cent ahead of those of September, and evidence is at hand to indicate a further gain before the end of the month. This is the third week in which deliveries have moved upward. Sales so far in October are double the tonnage booked in the previous month and include a fair amount of iron that is to be delivered in the first quarter. Most coverages are quiet, though here and there an open inquiry is reaching the market. An example of this is 500 tons needed by a specialty manufacturer in Indiana. Bids are being taken on 1800 tons of gray iron castings for the Chicago Post Office. Some resale Southern iron has moved in this market, giving rise to reports that prices are on the verge of softening. Releases of silvery are fair, considering the business situation as a whole, but new business is inactive.

Although steel market is spotty and demand sluggish, the outlook is somewhat improved.

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Railroad car order takes 7000 tons of steel. Santa Fe inquiring for 40,000 tons of rails and 12,000 tons of track supplies.

* * *

Railroads calling men back to shops, indicating early calls for steel for repair work.

* * *

Farm implement manufacturers have resumed production on a moderate scale.

* * *

Pig iron shipments in October 40 per cent of those in same period of September.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$17.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil. 1.50	\$25.04 to 27.04
S'th'n No. 2 fdy., sil. 1.75 to 2.25	17.01
Low phos., sil. 1 to 2, cop- per free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

BARS

Specifications for mild steel bars are up slightly, but the change is too light to be reflected in mill operations, which are variable. Some units are barely able to sustain output at 20 per cent of capacity, while others are producing at nearly 50 per cent. Prices are well established at 1.70c. a lb., Chicago, though \$1 a ton under this figure has been done on attractive business. Use of alloy steel bars is slowly creeping upward as automobile parts manufacturers and builders of farm equipment swing into heavier production schedules. One automobile bumper manufacturer has ordered steel, and a number of forge shops are feeling the impulse of demand for new automobile models. It is reported here that Ford has ordered steel for 1000 experimental cars that are to be built preparatory to the launching of the regular program. The Milwaukee Road and the Rock Island are calling men back to locomotive shops, thereby

opening another source for steel orders.

Rail steel bar mills report little change in orders and specifications. Output is adversely affected by sharply curtailed shipments of reinforcing bars for Illinois road work.

SHEETS

Prices are holding, but new buying has become increasingly spotty and specifications have forced output to a new low level in the range from 20 to 25 per cent of capacity. Distribution by jobbers is far below seasonal expectations, and the manufacturing trade shows no signs of gaining headway in the use of sheets.

Base prices per lb., deliv'd from mill in Chicago: No. 24 hot-rolled annealed, 2.55c.; No. 24 galv., 3.05c.; No. 10 hot-rolled, 1.85c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

CAST IRON PIPE

The time when the ground will be frozen draws nearer, and still buyers show no disposition to hurry projects that might well be completed this fall. Glamorgan Pipe & Foundry Co. has taken 200 tons for the Sanitary District, Chicago. Oak Hill, Ohio, readvertised Oct. 21, and Fort Wayne, Ind., will send out plans in about three weeks. Bethel, Ohio, will readvertise 350 tons, and Williamsburg, Ohio, has thrown out bids on 300 tons. Private buying is almost at a standstill.

Prices per net ton, deliv'd Chicago: Water pipe 6-in. and over, \$42 to \$44; 4-in., \$45 to \$47; Class A and gas pipe, \$3 extra.

RAILS AND TRACK SUPPLIES

The Santa Fe has come into the market for 40,000 tons of rails and 12,000 tons of accessories. The rail inquiry is more than 20,000 tons smaller than the purchase made late in 1930 and less than half of the total taken in 1929. However, the attitude being taken by Western railroads is that they will commit themselves now for barest needs and will make additional purchases later if business warrants. There are a few instances where railroads have removed rails from one section of track and relaid them in other sections rather than order out new rails. Some releases are already at mills against new contracts. Mills are using this tonnage to balance ingot operations, taking hot metal for rails only when that scheme fits best into general mill operations. The Chesapeake & Ohio is expected to buy at an early date 10,000 tons of tie plates, 4000 tons of angle bars and 1200 tons of spikes and bolts.

WIRE PRODUCTS

Production and shipments are well balanced with output, which is about 25 per cent of capacity. Releases by jobbers are light, but they specified rather liberally near the end of the third quarter, and as their stocks are moving slowly little can be expected from them for some time. Woven wire fencing is in light demand and fence posts are moving in like proportion. Most paving projects are now completed, and shipments of reinforcement mesh are near the vanishing point. Use of wire products by the manufacturing trade is spotty, but on the whole steady in aggregate volume.

STRUCTURAL MATERIAL

Both inquiries and awards continue to grow smaller and shops are extremely hungry for work. New contracts total only slightly more than 2000 tons, and fresh inquiries are for less than 4000 tons. There is much talk about an elevated highway leading westward from Chicago. Steel requirements are estimated at 80,000 tons of structural and 10,000 tons of bars. This project is being pushed as a measure to provide employment.

PLATES

Of outstanding interest in the local plate market is the fact that the Continental Construction Corp. is buying a right of way for a gas line from Geneseo, Ill., to Milwaukee. The distance is 160 miles, which will require 20,000 tons of pipe. The railroad equipment market is enlivened by an order for 750 gondolas by the Chicago & Illinois Midland. These cars will require about 7000 tons of steel. Demand for tank steel remains light, with bookings for the week at only a few hundred tons. Pipe mills in this district are using small quantities of skelp.

REINFORCING BARS

Estimators remain busy, but tonnages coming up for figures are small and many of them fall by the wayside. There is some prospect that the 1200 tons needed for the Cook County, Ill., nurses' home will be purchased this fall, and a grain elevator of large size may come out for figures. Road work has practically come to an end in Illinois and, almost regardless of the court findings in the wage rate law dispute, bar shipments for this purpose will not again be on a large scale until next spring. Prices remain variable and weak.

BOLTS, NUTS AND RIVETS

Specifications in October show improvement over the rate in September, but the margin is small and sellers are in doubt as to the future course of the market. Jobbers, who about three weeks ago ordered out larger quantities, are again very quiet,

indicating that these commodities are not moving readily from their stocks.

FERROALLOYS

Gains in shipments are still in evidence, but the rate of growth shows signs of being checked. Specifications are widely scattered and are usually for very small lots. New buying is at a standstill.

COKE

By-product foundry coke prices are steady at \$7.50 a ton, local ovens. Gains in shipments are noted.

OLD MATERIAL

The subject of boat shipments from Chicago is up again, but this time there is talk of moving cast iron wheels and steel axles, sizable quantities of which are said to be available in dealers' yards. The end of the navigation season is in sight, and unless there is liquidation of accumulations in dealers' hands there is little likelihood of scrap moving by boat, for the reason that production is low and there is insufficient time in which to accumulate tonnages from miscellaneous sources. Movement of heavy melting steel remains light, though a few cars have been taken by a mill that 10 days ago cut off all acceptances. Although demand for rerolling rails is not heavy, available supplies are lacking and dealers are being forced to pay \$10.50 a ton, on track. Punchings of special grade are still in demand for bridge ballast. When used for this purpose, they bring 50c. a ton above the market. Low shipments of ore are counted on by the scrap trade to lend strength to the market when demand again asserts itself. A factor that will react in favor of prices is the breakdown that has come in gathering facilities, a direct result

of dull market conditions over a long period.

Prices del'd Chicago dist. consumers:
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$7.75 to \$8.25
Shoveling steel.....	7.75 to 8.25
Frogs, switches and guards, cut apart, and misc. rails	7.75 to 8.25
Factory hyd. comp. sheets	6.50 to 7.00
Drop forge flashings.....	5.50 to 6.00
No. 1 busheling.....	6.00 to 6.50
Forg'd cast and r'd steel carwheels.....	8.50 to 9.50
Railroad tires, charg. box size.....	9.50 to 10.00
Railroad leaf springs cut apart.....	9.50 to 10.00
Axle turnings.....	6.00 to 6.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles.....	8.50 to 9.00
Coil springs.....	9.75 to 10.25
Electric Furnace Grades:	
Axle turnings.....	6.00 to 6.50
Low phos. punchings.....	10.00 to 10.50
Low phos. plates, 12 in. and under.....	9.00 to 9.50
Blast Furnace Grades:	
Cast iron borings.....	4.00 to 4.50
Short shoveling turnings..	4.00 to 4.50
Machine shop turnings....	4.00 to 4.50
Rolling Mill Grades:	
Rerolling rails.....	10.00 to 10.50
Cupola Grades:	
Steel rails, less than 3 ft..	9.75 to 10.25
Steel rails, less than 2 ft..	10.50 to 11.00
Angle bars, steel.....	8.50 to 9.00
Cast iron carwheels.....	9.00 to 9.50
Malleable Grades:	
Railroad.....	7.50 to 8.00
Agricultural.....	7.50 to 8.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relaying rails, 65 lb. and heavier.....	22.00 to 27.00

Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	7.00 to 7.50
Iron arch bars and transoms.....	8.00 to 8.50
Iron car axles.....	13.50 to 14.50
Steel car axles.....	11.00 to 11.50
No. 1 railroad wrought.....	6.50 to 7.00
No. 2 railroad wrought.....	6.75 to 7.25
No. 1 busheling.....	5.50 to 6.00
No. 2 busheling.....	4.00 to 4.50
Locomotive tires, smooth.....	10.50 to 11.50
Pipes and flues.....	4.50 to 5.00
Cupola Grades:	
No. 1 machinery cast.....	8.50 to 9.00
No. 1 railroad cast.....	7.00 to 7.50
No. 1 agricultural cast.....	7.00 to 7.50
Stove plate.....	6.25 to 6.75
Grate bars.....	5.50 to 6.00
Brake shoes.....	5.75 to 6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel.....	1.40c. to 1.80c.
Rail steel reinforcement—	
For buildings.....	1.20c. to 1.50c.
Highway slabs.....	1.40c.
For bridges and culverts.....	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Flats and squares.....	3.60c.
Bands, $\frac{3}{8}$ in. (in Nos. 10 and 12 gages).....	2.95c.
Hoops (No. 14 gage and lighter).....	3.50c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes ($\frac{3}{8}$ in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.

Per Cent Off List	
Machine bolts.....	73
Carriage bolts.....	73
Coach and lag screws.....	73
Hot-pressed nuts, sq., tap, or blank.....	73
Hot-pressed nuts, hex., tap, or blank.....	73
No. 8 black ann'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

Western Electric Buys Copper Smelter

The Nassau Smelting & Refining Co., and the plant and inventory of the Tottenville Copper Co., Tottenville, N. Y., have been acquired by the Western Electric Co., effective Nov. 1.

The Tottenville plant, which has a capacity for remelting about 25,000 tons of non-ferrous scrap metal annually, will provide an outlet for reclaiming scrap accumulated from the eastern lines of the Bell Telephone Co., as the company is already operating a smelter for scrap metals in the Chicago district. The former business of the Nassau Smelting & Refining Co. will be continued and non-ferrous scrap will be bought in the open market as required to supplement the company's own scrap material.

CLEVELAND Steel Demands are Broadening Slowly— Operations at Best Level Since June

CLEVELAND, Oct. 20.—Demand for finished steel for the second week in succession shows a slight uptrend. Orders during the week were a trifle more numerous, although still for small lots, and there was a little gain in inquiry.

Steel plant operations in Cleveland for the third successive week are unchanged at 35 per cent of ingot capacity, indicating a slightly better operation this month than during any previous month since June. One Lake blast furnace has been banked.

The road machinery building industry is one that shows signs of an uptrend, and this is reflected in a better demand for steel bars from that source. Some of the Southern States have inquiries out for sizable lots of road building equipment.

Broadening in the demand from the motor car industry is noticeable, although automobile manufacturers are following a rather cautious policy in ordering steel. While the production of motor cars is expected to make some gain in November, a much larger output is looked for in December. It appears to be the plan of some of the manufacturers to so arrange their production schedules that they will build only enough of their new models this year to stock up their dealers in time for the automobile shows and that will not necessitate more than a moderate production in November. The local Fisher Body plant, which makes Chevrolet bodies, expects to get operations up to nearly 50 per cent of capacity about Nov. 15.

There is some new activity in the building field, but it is confined almost wholly to public work. Cleveland has issued plans for its underground exhibit hall and garage, which will require 2000 tons of structural shapes and a like or larger amount of reinforcing bars. Bids will be taken Oct. 29. Buffalo is inquiring for a lift bridge, requiring 1000 tons.

Prices on finished steel appear to be well maintained. While there is some pressure and unconfirmed reports of shading in the Michigan territory, most of the mills are getting business in that territory at regular prices.

PIC IRON

Demand shows no change. Buying is still in small lots and for early needs. An expected improvement in shipping orders from the motor car industry has not materialized. Operation of jobbing foundries continues to be irregular. One of the two Toledo furnaces was banked during the week. Prices in the Lake district are steady but untested on round lots. Quotations on foundry iron range

from \$16 to \$17, Lake furnace. For Cleveland deliveries, local furnaces quote \$17.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.....	\$17.00
S'th'n fdy., sil. 1.75 to 2.25.....	17.01
Malleable.....	17.00
Ohio silvery, \$ per cent.....	24.00
Stand, low phos., Valley.....	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

IRON ORE

Lake furnaces consumed 1,470,219 tons of ore in September, a loss of 182,028 tons as compared with August. During September last year 3,281,573 tons was consumed. Furnace stocks Oct. 1 were 31,997,995 tons, and these stocks, together with ore on Lake Erie docks, were 37,971,649 tons on that date as against 38,366,056 tons on the same date a year ago. Ore consumption by central district furnaces in September was 742,959 tons, a loss of 131,177 tons. Lake furnaces used 721,592 tons, a loss of 35,766 tons. All-rail furnaces used 5380 tons, a loss of 6976 tons, and Eastern furnaces used only 288 tons, a loss of 8109 tons. There were 62 furnaces in blast using Lake ore Sept. 30, a decrease of six for the month.

BARS, PLATES AND SHAPES

Orders and inquiries for steel bars show a slight gain. Alloy steel bars are moving in a somewhat better volume to forge shops for automotive work. Plates and structural shapes continue dull. Barberton has placed a tank requiring 300 tons of plates. Few structural lettings are reported. Prices are well maintained at 1.65c., Cleveland, for steel bars and 1.60., Pittsburgh, for plates and shapes.

SHEETS

Orders from the motor car industry continue to show moderate improvement, but are not for large tonnages. Demand in this territory is still slow, although stamping plants are getting somewhat busier on automotive work. Metal furniture manufacturers are buying in small lots. Prices appear to be steady at regular quotations.

RAILROAD BUSINESS

The Chesapeake & Ohio Railroad has placed an order with the Greenville Car Co. for rebuilding car sides and bottoms, requiring 1500 tons of plates and shapes. This railroad is expected to place its track fastenings this week. While the Erie Railroad is expected to purchase 35,000 tons of rails, it is announced that this order

will not be placed until after the first of the year.

WIRE PRODUCTS

A slight seasonal gain is reported in nails, which are firm at \$1.90 a keg to jobbers. Wire is quiet.

STRIP STEEL

A slight improvement has appeared in the demand for cold-rolled strip from makers of automotive parts. The demand from this source has been affected somewhat recently by the low price of brass, which has caused a tendency toward its increased use for chromium plated parts. Hot-rolled strip continues very quiet. Prices are firm at 2.15c., Cleveland, for cold-rolled strip, and 1.55c., Pittsburgh, for wide strip and 1.65c. for narrow hot-rolled material.

OLD MATERIAL

One Valley district consumer has shut off shipments of blast furnace scrap and a Cleveland mill is taking very limited quantities. No steel-making scrap is being taken. Dealers are limiting their activity in steel-making grades to small-lot purchases for yard stocks. A limited demand has developed recently for cast scrap, which has declined in price. Prices on other grades are nominal.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$8.50 to \$9.00
No. 2 heavy melting steel.....	7.50 to 8.00
Compressed sheet steel.....	7.50 to 7.75
Light bundled sheet stampings.....	6.50 to 7.00
Drop forge flashings.....	6.75 to 7.00
Machine-shop turnings.....	5.00 to 5.50
Short shoveling turnings.....	6.50 to 7.00
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 busheling.....	6.75 to 7.00
Pipes and flues.....	5.50 to 6.00
Steel axle turnings.....	7.50 to 8.00
Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops.....	14.00 to 14.50
Blast Furnace Grades:	
Cast iron borings.....	6.50 to 6.75
Mixed borings and short turnings.....	6.50 to 6.75
No. 2 busheling.....	6.00 to 6.25
Cupola Grades:	
No. 1 cast.....	9.00 to 9.50
Railroad grate bars.....	6.00 to 6.50
Stove plate.....	6.00 to 6.50
Rails under 3 ft.....	15.00 to 15.50
Miscellaneous:	
Rails for rolling.....	13.00 to 13.50
Railroad malleable.....	11.00 to 11.25

Consumption of natural gas in the United States in 1929 constituted approximately 95 per cent of the world's supply. In an intensive study by the research staff of the National Industrial Conference Board, to be published in a forthcoming report, all the available facts regarding natural gas development have been gathered.

NEW YORK

Better Sentiment Prevails Among Steel Buyers, Though Purchases Are Still Small

NEW YORK, Oct. 20.—Despite the absence of open inquiry for pig iron in the past few weeks, a relatively fair amount of buying has occurred. Sales for the week at 3500 tons compare with 4000 tons the preceding week and 2500 tons two weeks ago. The Crane Co., Bridgeport, Conn., has purchased 1000 tons for early barge shipment, and the A. P. Smith Mfg. Co., East Orange, N. J., has closed on 300 tons of foundry iron for first quarter shipment. The Worthington Pump & Machinery Corp. has placed 125 tons for prompt shipment to its Harrison, N. J., plant. New inquiries include 1000 tons of low phosphorus iron for last quarter shipment, and 750 tons of foundry grades for delivery outside the district. Stocks of iron at foundries are reported to be at a minimum, and small users continue to buy sparingly for quick delivery. Shipments of Southern iron have been more frequent in the past 10 days than in some weeks, and eastern Pennsylvania furnaces have been prominent in a major part of recent business.

Prices per gross ton, delivered New York district:

*Buff. No. 2, del'd east.	
N. J.	\$17.78 to \$18.28
East. Pa. No. 2 fdy., sil.	
1.75 to 2.25.....	16.89 to 17.39
East. Pa. No. 2X fdy., sil.	
2.25 to 2.75.....	17.89 to 18.39

Freight rates: \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

FINISHED STEEL

Signs of minor improvement are in evidence, but gains in orders for some steel products are offset by declines in demand for other products. A frequent observation of steel sales executives is that many of their customers are in the most hopeful frame of mind in many months, and have definite expectations of improved business in the near future.

The Board of Transportation of New York has awarded 500 subway cars to the American Car & Foundry Co., subject to approval by the Board of Estimate. About 8000 tons of steel, including some alloy steels, will be required. The cars will be built at Berwick, Pa.

Fabrication of 24,000 tons of structural steel for the Inland Terminal, New York, for the Port of New York Authority will be done by the American Bridge Co. The Taylor-Fichter Steel Construction Co. will do the erecting.

Prices on blue annealed sheets in the New York district have been slightly disturbed by quotations of Eastern mills which truck the mate-

rial to users' plants. The delivered prices are a little below those of central district mills which ship all rail, and they are considering meeting the lower prices.

REINFORCING BARS

Prices are unchanged at 1.60c., Pittsburgh, or 1.93c., delivered, New York, with concessions of \$1 and \$2 a ton on desirable tonnages. Fresh inquiry generally involves small lots. The order for 5000 tons of bars for the Inland Terminal for the Port of New York Authority was placed by the general contractor, Turner Construction Co., with Jones & Laughlin Steel Corp. No sizable new projects came out during the week.

CAST IRON PIPE

New inquiries include 430 tons of small sizes for Greenburg, N. Y.; 165 tons of 12 and 16-in. for New Rochelle, N. Y., and 100 tons of 8-in. for Ardsley, N. Y. Bids on a contractor's job, requiring 1000 tons of 24-in. for Brooklyn, are expected to be taken this week. Awards made during the week included the following: 350 tons for the State Hospital, Medfield, Mass.; 300 tons of 6-in. for a Pennsylvania public utility; 150 tons for Portland, Me., and 100 tons of large sizes for Lynn, Mass., to Warren Foundry & Pipe Corp.; 200 tons of 16-in. for Sawmill sewer in Westchester County, N. Y., to Donaldson Iron Works, and 175 tons of 8-in. for Groton, Conn., to United States Pipe

& Foundry Co., which was also low bidder on about 1500 tons of 6 and 8-in. for the boroughs of Queens and Brooklyn.

Prices per net ton delivered New York: Water pipe, 6-in. and larger, \$32.90; 4-in. and 5-in., \$35.90; 3-in., \$42.90. Class A and gas pipe, \$3 extra.

OLD MATERIAL

No. 1 heavy melting steel is still being shipped to the consumer at Coatesville, Pa., brokers paying \$8 a ton for this delivery. Barge shipments of No. 1 steel are continuing from New York Harbor to Buffalo, and the dealer making these shipments is considering establishing a yard at tidewater, so that scrap may be accumulated during the winter months and barge deliveries continued when navigation is resumed on the barge canal next spring.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$4.50 to \$6.25
Heavy melting steel (yard)	3.00
No. 1 hvy. breakable cast.	6.00
Stove plate (steel works)...	3.50
Locomotive grate bars....	3.50
Machine shop turnings....	2.00
Short shoveling turnings..	2.00
Cast borings (blast fur. or steel works)	2.50
Mixed borings and turnings	2.00
Steel car axles.....	12.25 to 12.75
Iron car axles.....	15.00 to 15.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	5.50
Forge fire	3.25 to 3.75
No. 1 railroad wrought....	7.75
No. 1 yard wrought, long.	6.75
Rails for rolling.....	6.25 to 6.50
Stove plate (foundry)....	4.75 to 5.50
Malleable cast (railroad) ..	6.00 to 6.50
Cast borings (chemical) ..	8.00 to 8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machinery cast.....	\$8.50
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size)	6.50
No. 2 cast (radiators, cast boilers, etc.)	5.50

Steel Scrap off 25c. in Detroit

DETROIT, MICH., Oct. 20.—Despite the fact that heavy melting steel and hydraulic bundles are down 25c. a ton, sentiment in the scrap trade is more cheerful. The local steel plants have continued to buy small lots of scrap, but not in sufficient quantities to affect the market.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	\$6.00 to \$6.50
Borings and short turnings	4.50 to 5.00
Long turnings	4.00 to 4.50
No. 1 machinery cast....	8.50 to 9.00
Automotive cast	11.00 to 11.50
Hydraul. comp. sheets....	5.75 to 6.25
Stove plate	5.00 to 5.50
New No. 1 busheling....	5.00 to 5.50
Old No. 2 busheling....	3.25 to 3.75
Sheet clippings	3.50 to 4.00
Flashings	5.25 to 5.75

PHILADELPHIA

Mill Operations Are Unchanged—Sheet Inquiry Slightly Better

PHILADELPHIA, Oct. 20.—Steel mill operating rates are generally unchanged at an average of 26 per cent of capacity for the district. Inquiry, however, is still improving, and a fair tonnage promises to develop into actual orders. Some business in sheets is expected soon from automobile body builders, who are looking forward to slightly better operations in November. Demand for the heavier gages of blue annealed sheets is improving, with builders of light tanks and boilers more active. While plate inquiries are fairly well distributed, they are in most cases small, seldom exceeding a carload. On orders in excess of a carlot, \$1 a ton concessions are occasionally granted.

Current construction projects in this district include a small tonnage of plates to be bought for a coal breaker at St. Nicholas, Pa., in addition to about 350 tons recently awarded to a Coatesville, Pa., mill, about 250 tons of 16-in. lapweld pipe for approaches to the University Avenue bridge, Philadelphia, and a small tonnage of shapes for a hosiery manufacturing plant at Millville, N. J.

Rails for the Boston & Maine Railroad, totaling about 10,000 tons, have been placed with the Bethlehem Steel Co. No action has been taken yet by the Delaware & Hudson Railroad on its rail inquiry.

PIG IRON

Foundry consumers have generally eliminated stocks of iron in their yards, and in many instances have completed old contracts, so that sellers suggest that the fairly steady business in carloads being placed at present represents iron for immediate melting. Competition for tonnage is keen, and on desirable orders sellers have gone to \$15 a ton, furnace, a price that one large eastern Pennsylvania interest is unwilling to meet. Basic iron is quiet, with consumers generally well covered for the present. Some Indian basic is still being received by eastern Pennsylvania consumers.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$16.26 to \$16.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	16.76 to 17.26
East. Pa. No. 1X, 1.75 to 2.25 sil.	17.26 to 17.76
Basic (del'd east. Pa.)	16.75
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.04
Va. No. 2, 2.25 to 2.75 sil.	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

STEEL BARS

Demand for merchant bars is small, but prices are firm. Billet steel reinforcing bars are still subject to concessions of \$1 and \$2 a ton on desirable projects. Rail steel bars are quoted at 1.20c. to 1.30c., Pittsburgh, or 1.49c. to 1.59c., Philadelphia. A building for the Consolidated Cigar Mfg. Co. in Philadelphia, originally designed for structural steel, has been redesigned for reinforced concrete and will require about 500 tons of bars. Orders have been placed for 260 tons of bars for a bridge over the Lehigh Valley Railroad at Hillside, N. J., and 120 tons for a sewer in Princeton, N. J.

PLATES

Business in light plates for small tank and boiler fabrication has been fair, but tonnages are generally small. Concessions from 1.70c., Coatesville, Pa., or 1.80½c., Philadelphia, have recently appeared on desirable plate tonnages, but 1.70c. applies on current small orders. Mills which have been selling to Canada have found this business somewhat curtailed recently by the depreciation of Canadian exchange.

SHAPES

Industrial and other private construction continues to show some improvement over recent months. In addition to small local projects for factories and additions, an extension to the Washington Mills, cotton, Mayodan, N. C., requiring 150 tons, has been placed, and a tobacco warehouse at Winston-Salem, N. C., calls for 250 tons of shapes. Shape prices are slightly irregular, with concessions of \$1 and more a ton from 1.70c., f.o.b. nearest mill to consumer, or 1.76c., Philadelphia.

SHEETS

While sheet buying is not large, blue annealed sheets in the heavier gages are in better demand, and sell-

ers expect some tonnage from automobile body builders. In the radio industry, the plant at Camden, N. J., is operating at an improved rate, and schedules of one Philadelphia manufacturer are still several thousand sets a day. Sheet prices are firm, but buying by the automobile industry is expected to provide a more severe test of stability than any orders placed in this district since the new price schedule became effective.

IMPORTS

In the week ended Oct. 17, 501 tons of pig iron arrived at this port from British India and three tons of hoop steel was received from the United Kingdom.

OLD MATERIAL

The consumer at Bethlehem, Pa., has closed on about 1000 tons of No. 1 heavy melting steel, including one 500-ton order, with dealers at \$7.50 a ton, delivered. Meanwhile, brokers are paying \$8 a ton for this grade delivered to the consumer at Coatesville, Pa. Other grades of scrap are inactive except for occasional sales of distress carloads.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$7.50 to \$8.50
No. 2 heavy melting steel	7.00
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets (for steel works)	6.00
Hydraulic compressed, new	7.00 to 7.50
Hydraulic compressed, old	6.00 to 6.50
Machine shop turnings (for steel works)	5.50 to 6.00
Heavy axle turnings (or equiv.)	7.00 to 8.00
Cast borings (for steel works and roll. mill)	5.50 to 6.00
Heavy breakable cast (for steel works)	9.50 to 10.00
Railroad grate bars	7.50
Stove plate (for steel works)	7.50
No. 1 low phos. hvy. (0.04% and under)	12.00 to 13.00
Couplers and knuckles	11.00
Roller steel wheels	11.00
No. 1 blast furnace	5.50
Wrot. iron and soft steel pipe and tubes (new specific)	10.50 to 11.00
Shafting	15.00 to 15.50
Steel axles	16.00 to 16.50
No. 1 forge fire	7.50 to 8.00
Cast iron carwheels	12.00 to 12.50
No. 1 cast	11.00 to 11.50
Cast borings (for chem. plant)	11.50 to 12.00
Steel rails for rolling	10.50

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¼-in., inclu.	2.90c.
Spring steel	5.00c.
Hot-rolled, box annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	4.00c.
Hot rolled blue annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

Officials of the Milwaukee Road announce that approximately 1600 repair shop employees will return to work at Milwaukee, Minneapolis, Dubuque, Iowa, and Galewood, Ill., after a two months' lay-off. About 400 men are being called back to the locomotive shops of the Rock Island Railroad at Cedar Rapids, Iowa.

Jones & Laughlin Steel Corp. has moved its New York office this week from 165 Broadway to 500 Fifth Avenue. Robert M. Kilgore is district sales manager.

CINCINNATI Pig Iron Sales Increase—Northern Prices Subject to Concessions

CINCINNATI, Oct. 20.—Sales of pig iron in the past week increased sharply when an undisclosed consumer took advantage of low quotations on Northern iron to replenish its stock. Orders totaled about 2950 tons, more than twice those of the previous week's sales. The melt, however, has shown no change this month, as foundries continue to receive a spotty demand. Prices on Southern iron remain firm, while Northern iron continues to be uncertain of quotation, since furnaces are offering concessions to obtain business.

Prices per gross ton, deliv'd Cincinnati:
Ala. fdy., sil. 1.75 to 2.25.....\$14.69
Ala. fdy., sil. 2.25 to 2.75..... 15.19
Tenn. fdy., sil. 1.75 to 2.25..... 14.69
S'th'n Ohio silvery, 8 per cent..... 23.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

COKE

Two undisclosed consumers have contracted for their fuel needs for the next six months. Other new business was negligible. Shipments continue at about the September level.

FINISHED STEEL

Improvement in demand for sheets from automobile manufacturers is offset by the slackening of business from other sheet consuming fields. Accordingly, there has been no net gain in bookings. Demand is steady at slightly less than 40 per cent of capacity output.

ST. LOUIS Stove Manufacturers Curtailing Operations—Scrap Prices Take Further Dip

ST. LOUIS, Oct. 20.—The stove manufacturing interests, which have been the most active melters of pig iron in the St. Louis district in recent weeks, are now curtailing operations, awaiting more orders from retailers, whose sales have been below expectations on account of the warm weather and the general business depression. There has been no improvement in the melt by the open-hearth furnaces, whose operations are said to be about 17 per cent of capacity. Sales during the week were confined almost entirely to lots up to 100 tons. Shipments of the local maker are said to be holding up well, despite the lack of new business. The price situation is unchanged.

Prices per gross ton at St. Louis:
No. 2 fdy., sil. 1.75 to 2.25 f.o.b.
Granite City, Ill.....\$17.50
Malleable, f.o.b. Granite City..... 17.50
N'th'n No. 2 fdy., deliv'd St. Louis... 19.66
Southern No. 2 fdy., deliv'd..... 15.42
Northern malleable, deliv'd..... 19.66
Northern basic, deliv'd..... 19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinforce. bars.....	3.00c.
Rail steel reinforce. bars.....	3.00c.
Hoops.....	3.20c.
Cold-fin. rounds and hex.....	3.50c.
Squares.....	4.00c.
Hot-rolled annealed sheets (No. 24).....	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot-rolled sheets (No. 10).....	3.30c.
Structural rivets.....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.90
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c'd nails, base 100-lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.....	\$17.50
4-in.....	36.00
Lap-welded steel boiler tubes, 2-in.....	16.50
4-in.....	34.50

OLD MATERIAL

The Ashland unit of the American Rolling Mill Co. is taking a little blast furnace scrap on an old contract, but shipment to other district mills is retarded. New business is small and scarce. Prices are unchanged.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$6.75 to \$7.25
Scrap rails for melting.....	8.50 to 9.00
Loose sheet clippings.....	3.50 to 4.00
Bundled sheets.....	5.50 to 6.00
Cast iron borings.....	3.25 to 3.75
Machine shop turnings.....	4.00 to 4.50
No. 1 busheling.....	5.00 to 5.50
No. 2 busheling.....	3.25 to 3.75
Rails for rolling.....	9.00 to 9.50
No. 1 locomotive tires.....	8.50 to 9.00
No. 2 railroad wrought.....	6.75 to 7.25
Short rails.....	11.75 to 12.25
Cast iron carwheels.....	8.25 to 8.75
No. 1 machinery cast.....	10.00 to 10.50
No. 1 railroad cast.....	8.75 to 9.25
Burnt cast.....	4.25 to 4.75
Stove plate.....	4.25 to 4.75
Brake shoes.....	4.25 to 4.75
Agricultural malleable.....	8.00 to 8.50
Railroad malleable.....	9.00 to 9.50

FINISHED STEEL

Sales of plates, shapes and bars and sheets continue light. Users of steel products are still awaiting more orders for their output before ordering new supplies. Prices are unchanged.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
Cold-fin. rounds, shafting, screw stock.....	3.35c.
Hot-rolled annealed sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Hot-rolled sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	3.85c.
Galv. corrug. sheets.....	4.00c.
Structural rivets.....	4.00c.
Boiler rivets.....	4.00c.
Per Cent Off List	
Tank rivets, 5/16-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	73
Carriage bolts.....	73
Lag screws.....	73
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63

Railroad buying is not expected to show much life until after the turn of the year.

Fabricators of structural steel are operating at about 25 per cent of capacity, with awards made last spring still engaging some plants, work being strung out to afford employment to the most men.

OLD MATERIAL

Because of the low prices now prevailing for scrap, railroads are withholding the sale of their accumulations, and in some cases are withdrawing lists after they have been submitted to dealers for bids. The Chicago, Burlington & Quincy and the Missouri-Kansas-Texas this week withdrew lists of 8180 tons and 3366 tons respectively, while the Louisville & Nashville withdrew most of its list of 5000 tons after bids had been requested. The effect of this and the action of other railroads in issuing only very small lists is to reduce short selling by dealers. Because of low prices, country dealers are shipping no scrap to this market. The shortened supply is of no help to the market, as there is no call for scrap from the mills in this district, and prices on melting steel grades are off 25c. a ton, with other items from 25c. to \$1 off. Railroad lists before the market follow: International Great Northern, 1005 tons; Alton Railroad, 910 tons; St. Louis-San Francisco, 16 carloads, and St. Louis Southwestern, nine carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel.....	\$7.50 to \$8.00
No. 1 heavy melting or shoveling steel.....	7.00 to 7.50
No. 2 heavy melting or shoveling steel.....	6.75 to 7.25
No. 1 locomotive tires.....	8.00 to 8.50
Misc. stand-sec. rails including frogs, switches and guards, cut apart.....	8.25 to 8.75
Railroad springs.....	8.75 to 9.25
Bundled sheets.....	4.25 to 4.75
No. 2 railroad wrought.....	7.00 to 7.50
No. 1 busheling.....	6.00 to 6.50
Cast iron borings and shoveling turnings.....	4.75 to 5.25
Iron rails.....	7.00 to 8.00
Rails for rolling.....	9.50 to 10.00
Machine shop turnings.....	3.00 to 3.50
Heavy turnings.....	5.50 to 6.00
Steel car axles.....	10.50 to 11.00
Iron car axles.....	14.00 to 14.50
Wrot. iron bars and trans.....	5.50 to 6.00
No. 1 railroad wrought.....	5.00 to 5.50
Steel rails, less than 3 ft.....	10.00 to 10.50
Steel angle bars.....	7.00 to 7.50
Cast iron carwheels.....	6.50 to 7.00
No. 1 machinery cast.....	8.00 to 8.50
Railroad malleable.....	5.50 to 6.00
No. 1 railroad cast.....	6.25 to 6.75
Stove plate.....	7.00 to 7.50
Relay rails, 60 lb. and under.....	16.00 to 16.50
Relay rails, 70 lb. and over.....	20.00 to 21.00
Agricult. malleable.....	5.00 to 5.50

R. Y. Ferner Co., Investment Building, Washington, has appointed Blackman Hill Co., 1513 North Broadway, St. Louis, as its representative for precision measuring equipment in Missouri and southern Illinois, and the E. A. Kinsey Co., Cincinnati, as its agent in southern Ohio and Kentucky.

BUFFALO Steel Plant Operations Slightly Higher This Week—Pig Iron Sales Small

BUFFALO, Oct. 19.—Pig iron business the past week has been limited to small lots. Total sales probably were not more than 2500 tons. Prices are unchanged.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$17.00
No. 2N fdy., sil. 2.25 to 2.75.....	17.50
No. 1 fdy., sil. 2.75 to 3.25.....	18.50
Malleable, sil. up to 2.25.....	17.50
Basic.....	17.00
Large Superior charcoal.....	25.25

FINISHED STEEL

Operations of Buffalo steel mills this week are as follows: Lackawanna plant of Bethlehem Steel, 11 open-hearths; Republic Steel, three open-hearths; Wickwire Spencer, two open-hearths; Seneca Iron & Steel Co., 30 to 35 per cent; Gould Coupler, one open-hearth on part time. The bridge to be built over the Buffalo River at Michigan Avenue will require about 1000 tons of structural steel and 100 tons of reinforcing bars.

OLD MATERIAL

A recent order for No. 1 heavy melting steel has been increased 1000 tons, making the total volume of this grade of scrap on this particular order in the past month approximately 4000 tons. The price was \$9. A few scattering sales of No. 1 machinery cast at \$10 are reported. There is a demand at Niagara Frontier points for short shoveling turnings, and sales at \$7.25 are reported.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$9.00
No. 2 heavy melting scrap.....	7.50 to 8.00

Warehouse Prices, f.o.b. Buffalo

	Base per Lib.
Plates and struc. shapes.....	3.25c
Soft steel bars.....	3.00c
Reinforcing bars.....	2.65c
Cold-fin. flats and sq.....	3.65c
Rounds and hex.....	3.15c
Cold-rolled strip steel.....	5.25c
Hot-rolled annealed sheets (No. 24).....	3.70c
Galv. sheets (No. 24).....	4.10c
Bands.....	3.35c
Hoops.....	3.90c
Hot-rolled sheets (No. 10).....	3.50c
Com. wire nails, base per keg.....	\$2.45
Black wire, base per 100 lb.....	2.20

Scrap rails.....	9.50 to 10.00
Hydral. comp. sheets.....	7.50
No. 2 hydral. comp. sheets.....	7.00
Hand bundled sheets.....	7.00
Drop forge flashings.....	7.50
No. 1 busheling.....	7.50 to 8.00
Hvy. steel axle turnings.....	8.00 to 8.50
Machine shop turnings.....	4.50 to 5.00
No. 1 railroad wrought.....	7.50 to 8.00

Acid Open-Hearth Grades:	
Knuckles and couplers.....	10.00
Coil and leaf springs.....	10.00
Roller steel wheels.....	10.00
Low phos. billet and bloom ends.....	12.50 to 13.00

Electric Furnace Grades:	
Short shov. steel turnings.....	6.75 to 7.25

Blast Furnace Grades:	
Short mixed borings and turnings.....	6.00 to 6.50
Cast iron borings.....	6.00 to 6.50
No. 2 busheling.....	4.50 to 5.00

Rolling Mill Grades:	
Steel car axles.....	12.00
Iron axles.....	16.00 to 16.50
Cupola Grades:	
No. 1 machinery cast.....	10.00 to 10.50
Stove plate.....	8.25 to 8.50
Locomotive grate bars.....	7.00 to 7.50
Steel rails, 3 ft. and under.....	12.00 to 12.50
Cast iron carwheels.....	10.50 to 11.00

Malleable Grades:	
Industrial.....	10.00 to 10.50
Railroad.....	10.00 to 10.50
Agricultural.....	10.00 to 10.50
Special Grades:	
Chemical borings.....	9.00 to 9.50

changed, with the Tennessee company operating five and Gulf States Steel three.

CAST IRON PIPE

National Cast Iron Pipe Co. has been awarded 1000 tons by Oakland, Cal. American Cast Iron Pipe Co. is low bidder on 1400 tons at Denver, but the award is still pending. Aside from these jobs, current business has been routine and in lots ranging from a carload to 100 tons. Plant operations are at 30 to 35 per cent.

OLD MATERIAL

Only a slight amount of interest is shown in scrap. Shipments on contracts are still restricted, and new business is sporadic. Foundries are taking material only as actually needed and their stocks are meager. A number of revisions have been made in prices.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$8.50 to \$9.00
Scrap steel rails.....	8.50 to 9.00
Short shoveling turnings.....	4.00 to 5.00
Cast iron borings.....	(No market)
Stove plate.....	6.00
Steel axles.....	14.00
Iron axles.....	14.00
No. 1 railroad wrought.....	6.50
Rails for rolling.....	10.00
No. 1 cast.....	9.00
Tramcar wheels.....	10.00 to 10.25
Cast iron borings, chem.....	9.00

Canada

Some Bright Spots Appear in Dull Dominion Trade

TORONTO, Oct. 20.—While the immediate outlook for the Canadian iron and steel industry is not bright, some executives are of the opinion that the bottom of the depression has been reached and that any change in business conditions is likely to be upward. At this time, however, a number of plants are facing curtailment in operations and a few total suspension. Nothing in the way of new orders on a large scale has developed. Mills are running on reduced schedules and rapidly cleaning up what orders they had accumulated earlier in the year. There is nothing coming forward to take their place.

Some branches of the industry are benefiting from construction programs. The electrical industry is maintaining favorable operating schedules due to orders for hydro-electric power plant construction. The mining industry is operating at the highest record in history, and from this source a steady flow of orders for tools and other supplies is appearing. In addition, some of the larger mines and a number of new enterprises have announced plans for new mill construction. In Ontario, Quebec and Manitoba mining concerns have completed plans for construction work and machinery installation that will run into several millions of dollars.

BIRMINGHAM Some Improvement in Steel Bookings—Pig Iron Still Dull

BIRMINGHAM, Oct. 20.—The pig iron market is still without strength, and the furnaces drift from week to week with buying just as irregular and restricted as in past months. The outlook also has not changed, as there are no early prospects of an appreciable increase in melt. Orders continue to be mostly for carload lots for prompt shipment. Quotations for district tonnage continue at \$12, base. Furnace operations are the same this week as for last week, six stacks being active. Not since August, 1921, has the number been so low. The Tennessee company is operating two, Woodward Iron two, Republic Steel one and Sloss-Sheffield one. Five are on foundry and one on basic.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.....	\$12.00
No. 1 fdy., 2.25 to 2.75 sil.....	12.50
Basic.....	12.00

FINISHED STEEL

One manufacturer of steel in the district continues to report some improvement in bookings. The new tonnage of the other has changed but little. Present volume of new business is composed of miscellaneous orders, without any line showing any real activity. Buying of wire and wire products for the fourth quarter has been retarded somewhat by shipments against third quarter contracts, which continued until the middle of this month. A fair demand continues for sheets. Activities in structural steel and reinforcing bars have been sluggish, with an occasional order of size. Ingalls Iron Works reports the booking of 2000 tons for Duncan Field, Tex. McClintic-Marshall Corp. is said to have taken 2000 tons for the Miami Post Office. No bar tonnage of any consequence was booked last week. Open-hearth operations are un-

and others in these provinces and in Saskatchewan and British Columbia also are considering new equipment programs.

Structural steel fabricators are maintaining operations on an average of about 75 per cent capacity. While there has been something of a let-up in new orders, some contracts were closed recently which assure present rate of production by fabricators for several months. The automotive industry is said to be arranging for increased production. Makers of radios are busy and sales are said to be holding up at a comparatively high rate. Pipe manufacturing plants also are experiencing fairly satisfactory conditions.

PIG IRON

This market is featureless. Melters are still adhering to hand-to-mouth buying. Production of iron is at the lowest level since 1924, with but three furnaces blowing of 11 in Canada.

Prices per gross ton:

	Delivered Toronto
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable	22.60
	Delivered Montreal
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

OLD MATERIAL

Sales are practically at a standstill in steel grades, and iron scrap has but limited call. Mills are out of the market, but are said to be well stocked. Dealers' prices are unchanged.

Dealers' buying prices for old material: Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings.....	2.00	2.00
Boiler plate.....	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast.....	10.00	10.00
Stove plate	8.00	8.00
Standard carwheels.....	8.50	8.50
Malleable	8.00	8.00
	Per Net Ton	
No. 1 machinery cast.....	11.00
Stove plate	9.00
Standard carwheels.....	10.00
Malleable scrap	9.00

F.O.B. Warehouse Prices (Less than 5000 Lb.)

	San Fran- cisco	Los Angeles	Seattle
Plates and struc. shapes, 1/4-in. and heavier	2.80c.	3.00c.	2.25c.
Soft steel bars.....	2.80c.	3.00c.	2.25c.
Reinforcing bars.....	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24).....	3.90c.	4.00c.	3.50c.
Hot-rolled sheets (No. 10).....	3.40c.	3.50c.	3.00c.
Galv. sheets (No. 24).....	4.40c.	4.20c.	4.00c.
Struc. rivets, 1/2 in. and larger, less than 1000 lb.....	5.00c.	5.00c.	5.50c.
Special nails: common 4 to 60d; smooth box 4 to 20d; finish 6 and 8d; base per keg	\$2.55	\$2.45	\$2.40
Other wire nails, base per keg.....	2.80	2.70	2.65
Cement c't'd nails, 100-lb. keg.....	2.65	2.70	2.65

PACIFIC COAST

SAN FRANCISCO, Oct. 19.—More than 3000 tons of structural shapes was placed this week. Mill representatives and wholesalers of both steel products and pipe are agreed that movement for stocks and routine consumption has reached its low ebb.

BARS

Only 660 tons is reported to have been placed, with new major inquiries for 475 tons. This is one of the lightest weeks of the year.

CAST IRON PIPE

Award of 1150 tons for the East Bay Municipal Water District at Oakland went to National Cast Iron Pipe Co. instead of to American Cast Iron Pipe Co., which seemed to be low when bids were opened Oct. 5. No other contracts were placed during the week. Inquiries for 278 tons were received.

PIG IRON

Utah pig iron is quoted at \$17 f.o.b. Pacific Coast ports. Consumption by jobbing foundries in the Far West is light and has decreased steadily during the year. A small quantity of No. 3 pig iron is imported from Japan,

Low Point in Demand for Steel Believed to Have Been Reached

but not enough to disturb the market, even though the Japanese price is now below the domestic quotation.

PLATES

Lettings total 750 tons, and a newly reported project will require 200 tons. An 8-mile line of 36-in. pipe is planned at San Diego, from the El Capitan Dam to Lakeside, estimated to cost \$442,000.

RAILWAY SUPPLIES

Seattle has called for bids on 300 rolled steel car wheels, 33-in.

STEEL PIPE

The Pacific Gas & Electric Co. is reported to have appropriated over \$300,000 for a new line for natural gas from the Milpitas substation to San Francisco, following the hills up the San Mateo Peninsula.

STRUCTURAL SHAPES

A new building is planned by the Los Angeles Times, which it is estimated will require between 5000 and 6000 tons. The largest award of the week was the long-delayed Third Street bridge in San Francisco, requiring 1500 tons. Awards total 3170 tons, with new inquiries for 700 tons.

BOSTON

Pig Iron Sales Increase Sharply—Reinforcing Bar Prices Weak

BOSTON, Oct. 20.—From 500 tons the previous week, pig iron sales jumped to about 1400 tons, and an additional 500 tons may be closed late today. The Mystic Iron Works took about two-thirds of the business. Sales included Indian No. 2X at \$20.95 a ton, delivered, or \$19 on dock here, duty paid. Indian iron to arrive is sold well into November. No open inquiries are in the market, and the outlook for sales is not encouraging as the New England melt is still barely 20 per cent of rated capacity. A slump at Worcester, Mass., during the week more than offset slight increases elsewhere. One machinery maker there has less business on its books than at any previous time since 1908.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25..	\$19.91
*Buffalo, sil. 2.25 to 2.75..	19.91
†Buffalo, sil. 1.75 to 2.25..	19.28
†Buffalo, sil. 2.25 to 2.75..	19.28
*Ala., sil. 1.75 to 2.25.....	\$20.11 to 20.61
*Ala., sil. 2.25 to 2.75.....	20.61 to 21.11
†Ala., sil. 1.75 to 2.25.....	16.75
†Ala., sil. 2.25 to 2.75.....	17.25

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard. *All rail rate. †Rail and water rate.

REINFORCING BARS

Only one round lot, 375 tons of rail steel bars, was let the past week. Small orders aggregated about 200

tons. Competition even for small ton-nages is keen, and prices are decidedly soft. On billet steel bars in 1 to 5-ton lots the market is 2.75c. to 3c. a lb., base, from stock, while prices on anything larger than five tons are 1.75c. to 2c., the lowest level reached

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	*3.35c.
Structural shapes—	
Angles and beams.....	*3.35c.
Tees	*3.35c.
Zees	*3.35c.
Soft steel bars, small shapes.....	*3.25c.
Reinforcing bars.....	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75c. to 4.25c.
Hoop steel.....	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.80c.
Per Cent Off List	
Machine bolts	65 and 5
Carriage bolts	65 and 5
Lag screws	65 and 5
Hot-pressed nuts.....	40 and 10
Cold-punched nuts.....	40 and 10
Stove bolts	70 and 10
*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.	

this year. Rail steel bars heretofore generally 2.26½c. a lb., delivered Boston rate points, are now 2c. to 2.15c., and even 2c. was recently shaded.

OLD MATERIAL

The American Steel & Wire Co., Worcester, Mass., is buying a little No. 1 heavy melting steel at \$7 a ton, delivered, for which brokers are paying \$4.60, on cars shipping point. That mill, however, is temporarily out of the bundled skeleton market. A little breakable cast is moving to Pennsylvania melters and occasionally a car of engine blocks is sold. The scrap market otherwise is virtually at a standstill; consequently prices are largely nominal.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	\$4.10 to	\$4.60
Scrap T rails	4.10 to	4.60
Scrap girder rails	3.10 to	3.60
No. 1 railroad wrought....	4.50 to	5.00
Machine shop turnings....	1.25 to	2.10
Cast iron borings (steel works and rolling mill)	1.50 to	1.75
Bundled skeleton, long....	3.00 to	3.25
Forge flashings	3.00 to	3.50
Blast furnace borings and turnings	0.85 to	1.25
Forged scrap	2.00 to	2.50
Shafting	10.00 to	10.50
Steel car axles	11.00 to	12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	4.00 to	4.25
Rails for rolling.....	8.50 to	9.00
Cast iron borings, chemical	7.00 to	7.25
No. 2 cast	4.85 to	5.00

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$9.50 to	\$10.00
No. 1 machinery cast.....	9.50 to	10.00
Stove plate	5.00 to	5.25
Railroad malleable	10.50 to	11.00

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Youngstown

Steel Executives See No Important Turn Before Early Next Year

YOUNGSTOWN, Oct. 20.—This week the operations of Valley mills, based on active steel-making capacity, are around 20 per cent. The Carnegie Steel Co. is doing somewhat better than the independents.

Mills are confining their activities to actual orders, and no material except pig iron is being accumulated. Both the Youngstown Sheet & Tube Co. and the Sharon Steel Hoop Co. have large stocks of cold pig iron in their storage yards.

Steel company executives anticipate little change in the general situation until after the turn of the year. In appraising prospects for 1932, they feel that the first quarter will bring considerable improvement over present conditions.

The Truscon Steel Co. has received an order for 3500 steel windows for the new Marshall Field Estate Building in Chicago, delivery to be made in the spring. This order, with others, will engage the company's steel sash department during the winter. During several days last week Truscon received orders in excess of \$200,000, representing the largest single week's business in the past three months.

Fabricated Structural Steel

FABRICATED structural steel awards of 15,000 tons and new projects of 14,500 tons are larger than a week ago, but among the smallest weeks of the year. The only sizable awards are 1500 tons for a bridge in San Francisco, 2000 tons for shops and a boiler house at Duncan Field, Tex.

New projects include 2400 tons for a bridge over the Connecticut River at Erving, Mass., 2000 tons for a railroad viaduct in Oklahoma City, Okla., 1500 tons for a Federal reformatory at Springfield, Mo., and 1000 tons for highway bridges in Nebraska. Awards follow:

NORTH ATLANTIC STATES

State of Massachusetts, 100 tons, two State buildings, to A. L. Smith Iron Works.
 Chester, Pa., 250 tons, school building to Steel Service, a local broker.
 New York, 24,000 tons, building for Inland Terminal Warehouse between Ninth and Tenth Avenues, Fabrication awarded by Taylor-Fichter Steel Construction Co. to American Bridge Co.
 New York, 375 tons, public school 45 in Borough of Richmond to Harris Structural Steel Co.
 Meriden, Conn., 130 tons, service building, to Berlin Construction Co.
 Philadelphia, 120 tons, lumber shed, to Belmont Iron Works.
 Philadelphia, 156 tons, Summerdale Avenue bridge, to Fort Pitt Bridge Works.
 Hastings, N. Y., 520 tons, addition to school, to McClintic-Marshall Corpn.
 Comstock, N. Y., 200 tons, bridge over Barge Canal, to Lackawanna Steel Construction Co.
 Plattsburg, N. Y., 300 tons, bridge over Delaware & Hudson Railroad, to McClintic-Marshall Corpn.
 Lakeland, N. J., 600 tons, mental hospital, to Belmont Iron Works.
 Newark, N. J., 600 tons, garage, to Breen Iron Works.
 Philadelphia, 950 tons, addition to Market Street Elevated, to Lehigh Structural Steel Co.
 Ithaca, N. Y., 500 tons, agricultural building for Cornell University, to McClintic-Marshall Corpn.
 Erie, Pa., 500 tons, Y.M.C.A. building, to Erie Structural Steel Co.

SOUTH AND SOUTHWEST

Miami, Fla., 1545 tons, post office, to McClintic-Marshall Corpn.
 Duncan Field, Tex., 2000 tons, shops and boiler house, to Ingalls Iron Works.
 Dallas, Tex., 200 tons, National Air Transport Co., to Mosher Steel & Machinery Co.
 Austin, Tex., 1500 tons, bridges for Austin Bridge Co., general contractor, to McClintic-Marshall Corpn., Petroleum Iron Works, Mosher Steel & Machinery Co., and Houston Structural Steel Co.
 Custer County, Okla., 1500 tons, highway bridge, to Kansas City Structural Steel Co.

CENTRAL STATES

Wyandotte, Mich., 500 tons, boiler house, to Whitehead & Kales Co.
 Evansville, Ind., 1000 tons, Franklin Street bridge, to American Bridge Co.
 Chicago, 200 tons, St. Sabinas Church, to Hansell-Elecock Co.
 Milwaukee, 450 tons, interurban bridge for T. M. E. R. & L. Co., to Wisconsin Bridge & Iron Co.
 Milwaukee, 140 tons, Marquette University Medical School, to Milwaukee Bridge Co.
 Milwaukee, 100 tons, Electric Railway & Light Co., to William F. Eichfeld & Son Co.

WESTERN STATES

Boulder City, Nev., 150 tons, bridge, to International Derrick & Equipment Co.
 Los Angeles, 625 tons, sheet steel piling for San Gabriel River outlet, to Pacific Coast Steel Corpn.
 Los Angeles, 120 tons, County bridge at Downey, to Consolidated Steel Corpn.
 Wenatchee, Wash., 100 tons, jail equipment, to Stewart Iron Works.
 San Francisco, 1500 tons, Third Street bridge, to Pacific Coast Engineering Co.
 Pasadena, Cal., 200 tons, Post newspaper building, to McClintic-Marshall Corpn.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

NORTH ATLANTIC STATES

Exeter, N. H., 211 tons, school.
 Cambridge, Mass., 200 tons, court house.

Cambridge, 150 tons, Radcliffe College units.
 Dedham, Mass., 318 tons, high school.
 Erving, Mass., 2400 tons, bridge over Connecticut River.
 Providence, R. I., 150 tons, elementary school on Windmill Street.
 Hartford, Conn., 1450 tons, post office, to Karl Koch Erecting Co., New York; fabrication not yet awarded.
 Millville, N. J., 100 tons, plant for Millville Hosiery Co.
 Phillipsburg, N. J., unstated tonnage, Nurses' Home for State hospital.
 New York, 550 tons, public school No. 85.
 State of New Jersey, 150 tons, bridge on route 2, section 6; general contractor, John A. Rubino.
 Buffalo, 1000 tons, Michigan Avenue bridge.
 Whitehall, N. Y., 700 tons, grade crossing elimination bridge.
 Wilmington, Del., 250 tons, Eleventh Street bridge over Brandywine Creek.
 New York, 500 tons, public school 79 at Whitestone, Long Island; bids rejected and will be readvertised.
 Jersey City, N. J., 1950 tons, armory for 113th infantry, National Guard, bids rejected for second time and will be readvertised.
 New Rochelle, N. Y., 150 tons, armory for Naval militia; low bidder for general contract, George Colon Construction Co.
 Yonkers, N. Y., 200 tons, joint sewage disposal plant for Yonkers and adjoining town.
 Wingdale, N. Y., 1400 tons, Harlem Valley Hospital building to Karl Koch Erecting Co.; fabrication not yet placed.

SOUTH AND SOUTHWEST

Winston-Salem, N. C., 250 tons, tobacco warehouse for R. J. Reynolds Tobacco Co.
 Georgetown, Del., 100 tons, post office.
 Jacksonville, Fla., 550 tons, parcel post building; James I. Barnes, Logansport, Ind., low bidder on general contract.
 Oklahoma City, 2000 tons, viaduct for Santa Fe Railroad.
 Baton Rouge, La., 1400 tons, State highway bridges.

CENTRAL STATES

Alma, Wis., 620 tons, Lock No. 4 on Mississippi River; bids close Nov. 17.
 Wausau, Wis., 600 tons, highway bridge.
 State of Nebraska, 1000 tons, highway bridges.
 Springfield, Mo., 1500 tons, Federal reformatory; bids to be opened Dec. 12 by Supervising Architect, Treasury Department, Washington.
 Fort Wayne, Ind., 350 tons, filtration plant.
 Oak Park, Ill., 400 tons, Goldberg arcade.

WESTERN STATES

Boulder City, Nev., 600 tons, storage bins for Six Companies, Inc.

CANADA

Ottawa, Ont., 500 tons, United States legation building.

FABRICATED PLATE

Awards

Pittsburgh, 1800 tons, 12 barges for Pittsburgh Gravel Co., to Jones & Laughlin Steel Corpn.
 Los Angeles, 250 tons, book racks for University of Southern California library, to Sneed & Co.
 Barberton, Ohio, 300 tons, plates, tank, for municipal water department, to Pittsburgh-Des Moines Steel Co.

Projects Pending

Seattle, 400 tons, standpipes at West Seattle reservoir; Pittsburgh-Des Moines Steel Co., low bidder.
 Lone, Cal., 200 tons, penstock at State reform school.
 Edgewater, N. J., 700 tons, plate construction of tanks and vats at Lever Brothers plant.

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$29.00
Rerolling, 4-in. and under 10-in., Youngstown	29.00
Rerolling, 4-in. and under 10-in., Cleveland	29.00
Rerolling, 4 in. and under 10-in., Chicago	31.00
Forging quality, Pittsburgh	35.00

Sheet Bars	
	Per Gross Ton
(Open-Hearth or Bessemer)	
Pittsburgh	\$29.00
Youngstown	29.00
Cleveland	29.00
Slabs	
	Per Gross Ton
(8 in. x 2 in. and under 10 in. x 10 in.)	
Pittsburgh	\$29.00
Youngstown	29.00
Cleveland	29.00

Skelp	
	Per Lb.
(F.o.b. Pittsburgh or Youngstown)	
Grooved	1.00c.
Universal	1.00c.
Sheared	1.00c.
Wire Rods	
	Per Gross Ton
(Common soft, base)	
Pittsburgh	\$33.00
Cleveland	32.00
Chicago	36.00

PRICES OF RAW MATERIAL

Ores	
	Per Gross Ton
Lake Superior Ores, Delivered Lower Lake Ports	
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Iron ore, basic and foundry, Russian, average 63% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 26c.
Manganese ore, African or Indian, 50 to 52%	23c. to 24c.
Manganese ore, Brazilian, 46 to 48%	22c. to 23c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.50
Chrome ore, 45% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	
	Per Gross Ton
Chrome ore, 48% Cr ₂ O ₃ , c.i.f. Atlantic seaboard	\$20.00

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or gulf port, duty paid	\$80.00 to 85.00
*Minimum price quoted for lots of 2000 tons or more.	
Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	\$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered	105.00
2.50% carbon grade	115.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.40
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
Furnace	
	Per Gross Ton
10%	\$35.00
11%	37.00
12%	37.00
14 to 16%	\$1.00
Bessemer Ferrosilicon	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$25.00
11%	26.00
12%	27.00
13%	\$20.00
14%	31.00
15%	33.00

Fluxes and Refractories	
	Per Net Ton
Fluorspar	
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$13.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, 1/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.30 to .40
Gas slack, f.o.b. W. Pa. mines	.10 to .20

Silvery Iron	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
6%	\$20.00
7%	20.50
8%	21.00
9%	21.50
10%	22.00
11%	\$23.00
12%	24.00
13%	26.00
14%	28.00
15%	30.00

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-Heat	
Duty Brick	\$40.00
Intermediate Heavy Duty Brick	\$32.00 to \$35.00
Pennsylvania	40.00
Maryland	40.00
New Jersey	\$44.00 to 59.00
Ohio	40.00
Kentucky	40.00
Missouri	37.00
Illinois	40.00
Ground fire clay, per ton	6.50

Other Ferroalloys	
Ferrotungsten, per lb. contained metal del'd, carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr, per lb. contained Cr. delivered, in carloads	11.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	24.50c. to 26.00c.
Ferrocromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. contained Mo., delivered	1.00
Calcium molybdate, per lb. contained Mo., delivered	85c.

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts	
	Per Cent Off List
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
*Machine bolts	73 and 10
*Carriage bolts	73 and 10
Lag bolts	73 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73 and 10
Hot-pressed nuts, blank or tapped, square	73 and 10
Hot-pressed nuts, blank or tapped, hexagons	73 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73 and 10
Washers*	7.00c. to 6.75c. per lb. off list

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagons nuts	73 and 10
Semi-finished hexagons castellated nuts, S.A.E.	73 and 10
Stove bolts in packages, P'gh.	80, 10, 10, 10 and 5
Stove bolts in packages, Ch'go.	80, 10, 10, 10 and 5
Stove bolts in pkgs., Cleveland	80, 10, 10, 10 and 5
Stove bolts in bulk, P'gh.	80, 10, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Ch'go.	80, 10, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	80, 10, 10, 10, 5 and 2 1/2
Tire bolts	60, 10 and 10

Small Rivets	
	Per Cent Off List
(7/8-in. and smaller)	
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

*F.o.b. Chicago, New York and Pittsburgh.
 *Bolts with rolled thread up to and including 1/2 in. x 6 in. take 10 per cent lower list prices.

Large Rivets	
	Base per 100 Lb.
(1/2-in. and larger)	
F.o.b. Pittsburgh or Cleveland	\$2.25
F.o.b. Chicago	2.35

Cap and Set Screws	
	Per Cent Off List
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.E. thread	85 and 10
Upset set screws, S.A.E. thread	85 and 10
Milled studs	80, 10 and 5

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel	Base per Lb.
Pittsburgh mill, f.o.b.	1.60c.
Chicago mills, f.o.b.	1.70c.
Philadelphia, f.o.b.	1.80c.
New York, f.o.b.	1.90c.
Cleveland, f.o.b.	1.65c.
Lackawanna, f.o.b.	1.70c.
Birmingham, f.o.b.	1.70c.
Pacific ports, c.i.f.	2.00c.
Billet Steel Reinforcing	
40, 50, 60-ft. mills, f.o.b.	1.60c.
Birmingham, mill lengths, f.o.b.	1.75c.
Cleveland, f.o.b.	1.55c. to 1.60c.
Rail Steel	
East of Chicago dist., f.o.b.	1.30c. to 1.35c.
Chicago Heights mill, f.o.b.	1.50c. to 1.60c.
Philadelphia, f.o.b.	1.49c. to 1.59c.

Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.25c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

Pittsburgh mill.....	1.60c.
Chicago.....	1.70c.
Birmingham.....	1.70c.
Cleveland.....	1.78 1/2c.
Philadelphia.....	1.80 1/2c.
Cotatesville.....	1.70c.
Sparrows Point.....	1.70c.
Lackawanna.....	1.70c.
New York.....	1.88c.
Pacific ports.....	1.85c. to 1.90c.

Structural Shapes

Base per Lb.	
Pittsburgh mill.....	1.60c.
Chicago.....	1.70c.
F.o.b. Birmingham.....	1.70c.
F.o.b. Lackawanna.....	1.70c.
F.o.b. Bethlehem.....	1.70c.
Del'd Cleveland.....	1.78 1/4c.
Del'd Philadelphia.....	1.71c. to 1.76c.
Del'd New York.....	1.85 1/4c.
C.I.F. Pacific ports.....	2.05c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh.....	1.65c.
Wider than 6 in., P'gh.....	1.55c.
6 in. and narrower, Chicago.....	1.75c.
Wider than 6 in., Chicago.....	1.65c.
Cooperage stock, P'gh.....	1.75c. to 1.85c.
Cooperage stock, Chicago.....	1.85c. to 1.95c.

Cold-Finished Steel

	<i>Base per Lb.</i>
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 3.40c.
Strips, P'gh.....	2.15c.
Strips, Cleveland.....	2.15c.
Strips, deliv'd Chicago.....	2.43c.
Strips, Worcester.....	2.30c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.20c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)	
To Manufacturing Trade	
Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

Standard wire nails.....	\$1.90
Smooth coated nails.....	1.90
Galvanized nails.....	3.90

To Retail Trade

Smooth coatd nails.....	1.90
Galvanized nails	3.90
	<i>Base per Lb.</i>
Smooth annealed wire.....	2.35c.
Smooth galvanized wire.....	2.80c.

To Retail Trade

Barbed wire, galvanized.....	2.55c.
Woven wire fence, Nos. 9 and 11 gage, per net ton.....	\$55.00
Woven wire fence, No. 12 1/2 gage and lighter, per net ton.....	60.00
<i>To Retail Trade</i>	

To Retail Trade

Smooth annealed wire	2.45c.
Smooth galvanized wire	2.90c.

To Retail Trade

Polished staples	2.45c.
Galvanized staples	2.70c.
Barbed wire, galvanized.....	2.65c.
Woven wire fence, Nos. 9 and 11 gage, per net ton	\$60.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Sheets

Hot-Rolled

Base per lb.	
No. 10, f.o.b. Pittsburgh	1.70c.
No. 10, f.o.b. Chicago mills	1.80c.
No. 10, del'd Philadelphia	1.99c.
No. 10, f.o.b. Birmingham	1.85c.
No. 10, c.i.f. Pacific Coast ports	2.35c.

Hot-Rolled and Annealed

No. 10, Pittsburgh	1.85c.
No. 10, Chicago mills	1.95c.
No. 10, Birmingham	2.00c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Chicago mills	2.50c.
No. 24, del'd Philadelphia	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, c.i.f. Pacific Coast ports	2.88c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.35c.
No. 10 gage, f.o.b. Chicago mills	2.45c.
No. 10 gage, del'd Philadelphia	2.64c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Chicago mills	3.05c.
No. 20 gage, del'd Philadelphia	3.24c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.10c.
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Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.75c.
No. 20, f.o.b. Pittsburgh	3.35c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.90c.
No. 24, f.o.b. Chicago mills	3.00c.
No. 24, del'd Philadelphia	3.19c.
No. 24, f.o.b. Birmingham	3.05c.
No. 24, c.i.f. Pacific Coast ports	3.38c.

Long Terns

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	3.15c.
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Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.90c.
No. 20, f.o.b. Pittsburgh	3.40c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.65c.
No. 28, Chicago mills	2.75c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills...	\$4.75
Standard cokes, f.o.b. Gary.....	4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)		
Alloy Quantity Bar Base, 2.65c. per Lb.		
S.A.E. Series	Alloy	Differential
Numbers		per 100 Lb.
2000	(1½% Nickel)	\$0.25
2100	(1½% Nickel)	0.55
2300	(3¼% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum (1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bar	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

	<i>Per Gross Ton</i>
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00

Track Equipment

	Base per 100 Lb.
Spikes, $\frac{3}{4}$ in. and larger.....	\$2.70
Spikes, $\frac{1}{2}$ in. and larger.....	2.70
Spikes, boat and barge.....	2.90
Tie plate, steel.....	1.85
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel	Galv.	Iron	Black	Galv.
Inches		Inches		
1/8	47	2 1/2	1 1/2 and 3/4	+11 +36
1/4	53	2 7/8	1 3/4	23 5
3/8	58	4 1/2	3/4	28 11
1/2	62	5 1/2	1 and 1 1/4	31 15
3/4	64	5 1/2	1 1/2 and 2	35 18

Lap Weld

2	57	4 3/4	2	23 9
2 1/2	61	4 3/4	2 1/2 to 3 1/2	28 13
3	61	4 3/4	3 1/2 to 4	30 17
3 1/2	61	4 3/4	4 to 6	30 17
4	61	4 3/4	7 and 8	29 16
4 1/2	61	4 3/4	9 to 12	26 11

Butt Weld, extra strong, plain ends

1 1/8	43	2 1/2	1 1/4 and 3/4	+13 +48
1 1/4	49	3 1/2	1 1/2	23 7
1 1/2	55	4 1/2	3/4	28 12
1 3/4	60	4 1/2	1 to 2	34 18
2	63	5 1/2		

Lap Weld, extra strong, plain ends

2	55	4 1/2	2	29 13
2 1/2	59	4 1/2	2 1/2 to 4	34 20
3	58	4 1/2	4 1/2 to 6	33 19
3 1/2	54	4 1/2	7 and 8	31 17
4	47	3 1/2	9 to 12	21 8
4 1/2	46	3 1/2		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2 1/2%, and on galvanized by 1 1/2 points with supplementary discounts of 5 and 2 1/2%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2½ in.	1½ in. 1
2½ in.—2¾ in.	1¾ in. 8
3 in. 52	2 in.—2¼ in. . . . 13
3¼ in.—3¾ in.	2 in.—2¼ in. . . . 13
4 in. 57	3 in. 17
4½ in. to 6 in.	3¼ in. to 3½ in. . 18
	4 in. 20
	4½ in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Roller Tubes

Cold Drawn		Cold Drawn	
1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2 1/4 in.	38	3 3/4 to 3 1/2 in.	54
2 1/2 and 2 3/4 in.	46	4 in.	57
3 in.	52	4 1/2, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List	
Carbon, 0.16% to 0.30% base (carloads)...	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Increased Copper Sales— Zinc and Lead Prices Decline Sharply

NEW YORK, Oct. 20.

COPPER

Although the price of electrolytic copper has continued unchanged at 7c. a lb., delivered Connecticut Valley, domestic buyers were increasingly active early in the week, and export sales were substantial. This has brought a firmer attitude on the part of custom smelters, who are less willing than in previous weeks to sell at the present market for delivery in the first and second quarters of next year. The representatives of foreign copper producers, who will confer with American companies in New York on world overproduction of the metal, have arrived and discussions are expected later this week. Lake copper is quiet and unchanged at 7.37½c. delivered.

The price of Copper Exporters, Ltd., is unchanged at 7.50c. a lb., c.i.f. usual European ports. The past week has marked a continuation of active foreign purchasing, so that the total of sales for the month to Oct. 20, is about 16,000 tons. Even should foreign demand decline somewhat during the rest of this month, the total is expected to be considerably in excess of that of September or August.

TIN

The London market has held steady during the week as a result of group support, but sales of tin here have been small and the price lacking in strength. Dullness of the American market is attributed to smaller requirements in the tin plate industry. The price for spot tin, New York, advanced from 23.12½c. a lb., on Oct. 14 to 24.25c. a lb., on Oct. 15, after which it steadily settled to 22.70c. a lb., yesterday. Today, the price was slightly stronger at 23c. a lb. The London price today is £127 2s. 6d. for spot standard, £129 10s. for future standard, £131 2s. 6d. for spot Straits, and the Singapore quotation is £132 2s. 6d. a ton. United Kingdom stocks have declined 217 tons to a total of 29,508 tons. Shipments from Singapore are slightly in excess of the estimate for this month, totaling 4237 tons on Oct. 17, so that the estimate of 7000 to 7500 tons will probably be exceeded.

LEAD

Consumers are covering only immediate requirements, and although the market is in a fair statistical po-

	THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY					
	Oct. 20	Oct. 19	Oct. 17	Oct. 16	Oct. 15	Oct. 14
Lake copper, New York.....	7.37½	7.37½	7.37½	7.37½	7.37½	7.37½
Electrolytic copper, N. Y.*.....	6.75	6.75	6.75	6.75	6.75	6.75
Straits tin, spot, N. Y.	23.00	22.70	22.87½	24.25	23.12½
Zinc, East St. Louis.....	3.30	3.30	3.30	3.35	3.35	3.35
Zinc, New York.....	3.65	3.65	3.65	3.70	3.70	3.80
Lead, St. Louis.....	3.52½	3.82½	3.82½	3.82½	3.82½	3.82½
Lead, New York.....	3.75	4.00	4.00	4.00	4.00	4.00

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.50c. to 6.55c. a lb., New York.

sition with stocks at the end of September 132,804 tons, compared with 134,977 tons at the end of August, sellers have reduced the market \$6 a ton, St. Louis, and \$5 a ton, New York. The current quotations, which appeared today, are 3.75c., New York, and 3.52½c., St. Louis. With practically no lead sold for delivery in November, producers are inclined to expect some increase in buying in two weeks.

ZINC

Prices have declined a total of \$3 a ton during the week, sales having been made on Oct. 15, at 3.35c., East St. Louis, and 3.70c., New York, and on Oct. 17, at 3.30c., East St. Louis and 3.65c., New York. Today, sellers are showing a slightly firmer attitude and seeking to obtain \$1 a ton higher price on small lots of zinc. One prospective buyer has inquired for a tonnage for delivery over the next six months at 3.30c., East St. Louis, but

sellers do not believe this offer is likely to be accepted because of the long delivery.

ANTIMONY

Sales continue limited to small lots and the Chinese metal is generally unchanged at 6.50c. to 6.55c. a lb., duty paid, New York. On the smaller lots, the higher price is usually charged by importers and by the domestic producer. Antimony for future delivery shows a tendency to firmness with 6.45c., duty paid, being asked, but on a substantial order, it is suggested that 6.40c., New York, could still be done.

Inland Steel Co., Chicago, has completed buildings and it is now installing machinery in the new mill in which will be produced universal mill plates, wide strips and sheet steel in a complete range of grades, including the finest finishes.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.	
High brass.....	13.00c.
*Copper, hot rolled, base sizes, 1000 lb. and more.....	16.12½c.
Seamless Tubes—	
Brass.....	16.25c.
Copper.....	15.62½c.
Brass Rods.....	11.25c.
Brazed Brass Tubes.....	21.75c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.	
Zinc sheets (No. 9), casks 9.25c. to 9.50c.	
Zinc sheets, open.....	10.25c. to 10.50c.

Metals from New York Warehouse

Delivered Prices, per Lb.	
Tin, Straits pig.....	25.00c. to 26.00c.
Tin, bar.....	27.00c. to 29.00c.
Copper, Lake.....	9.00c. to 10.00c.
Copper, electrolytic.....	8.50c. to 9.00c.
Copper, casting.....	8.25c. to 8.75c.
Zinc, slab.....	5.00c. to 5.50c.
Lead, American pig.....	5.00c. to 6.00c.
Lead, bar.....	6.75c. to 7.75c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	20.00c. to 23.00c.
Alum. ingots, No. 12 alloy.....	19.00c. to 21.00c.
Babbitt metal, commercial grade.....	19.00c. to 29.00c.
Solder, ½ and ⅓.....	16.50c. to 17.50c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.	
Tin, Straits pig.....	27.00c.
Tin, bar.....	29.00c.
Copper, Lake.....	8.37½c.
Copper, electrolytic.....	8.37½c.
Copper, castings.....	8.00c.
Zinc, slab.....	5.00c.
Lead, American pig.....	4.75c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	10.00c.
Babbitt metal, medium grade.....	15.00c.
Babbitt metal, high grade.....	31.00c.
Solder, ½ and ⅓.....	19.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (All prices are nominal because of uncertain condition of market.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.25c.	6.00c.
Copper, hvy. and wire	5.00c.	5.75c.
Copper, light and bottoms	4.25c.	5.00c.
Brass, heavy.....	2.75c.	3.50c.
Brass, light.....	2.25c.	3.00c.
Hvy. machine composition	4.00c.	4.75c.
No. 1 yel. brass turnings	3.00c.	3.50c.
No. 1 red brass or compos. turnings..	3.75c.	4.50c.
Lead, heavy.....	2.75c.	3.25c.
Zinc.....	1.25c.	1.75c.
Sheet aluminum.....	9.00c.	11.00c.
Cast aluminum.....	3.25c.	5.00c.

Reinforcing Steel

Awards the Heaviest in More Than Two Years

INCLUDING 5000 tons for the Inland Terminal Building in New York, 4800 tons for two Government buildings in Washington and 2550 tons for a sewer in Louisville, Ky., billings of reinforcing steel the past week totaled 15,600 tons, the largest in more than two years. Pending projects were also heavier, amounting to 8000 tons, compared with 4800 tons a week ago. The largest new job is 5000 tons for a retaining wall on the Mississippi River in Iowa. Awards follow:

State of Massachusetts, 375 tons, Uxbridge State road, to Northern Steel Co.
New York, 5000 tons, Inland Terminal for Port of New York Authority; Turner Construction Co., general contractor; reinforcing bars to be furnished by Jones & Laughlin Steel Corpn.
Mitchel Field, L. I., 560 tons; 400 tons for hangars and 160 tons for barracks, to Concrete Steel Co.
Hillside, N. J., 265 tons, bridge over Lehigh Valley Railroad, to Kalman Steel Co.
State of New Jersey, 300 tons, bridges and road pavement on Route 36, section 1, to Heller Brothers, Newark.
Princeton, N. J., 120 tons, sewer construction, to Kalman Steel Co.
Washington, 2200 tons, Federal warehouse, to Rosslyn Steel & Cement Co., Rosslyn, Va.
Washington, 2600 tons, rail steel, Department of Commerce Building, to Kalman Steel Co.
Louisville, Ky., 2550 tons, sewer, to Laclede Steel Co.
Oklahoma City, 1000 tons, Santa Fe Railroad, to a Chicago bidder.
Los Angeles, 600 tons, men's and women's gymnasiums at University of California, to Pacific Coast Steel Co.

REINFORCING BARS PENDING

Inquiries for reinforcing steel bars include the following:

State of Massachusetts, 300 tons, State bridges.
Philadelphia, 500 tons, building for Consolidated Cigar Mfg. Co., formerly structural steel, but redesigned for concrete.

Wilmington, Del., 260 tons, Eleventh Street bridge over Brandywine Creek.

Buffalo, 100 tons, bridge over Buffalo River at Michigan Avenue.

Chicago, 500 tons, Fine Arts building in Jackson Park.

Elgin, Ill., 125 tons, school.

Oak Park, Ill., 100 tons, Goldberg arcade.

Aurora, Ill., 100 tons, post office.

Chicago, 500 tons, 16-story apartment buildings; S. Minchen is architect.

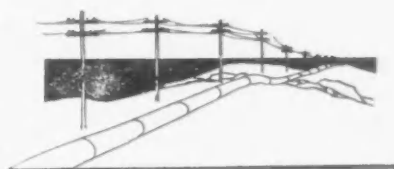
Alma, Wis., 300 tons, Lock No. 4 on Mississippi River; bids close Nov. 17.

North Little Rock, Ark., 150 tons, Veterans' Hospital.

Davenport, Iowa, 5000 tons, retaining wall on Mississippi River.

Berkeley, Cal., 310 tons, building at State deaf and dumb school.

PIPE LINES



San Joaquin Light & Power Corpn., Fresno, Cal., a subsidiary of Pacific Gas & Electric Co., San Francisco, is planning a natural gas pipe line from oil properties at Kettleman Hills to vicinity of Fresno and Merced, Cal., about 60 miles.

Virginia Gas Distribution Co., Clifton Forge, Va., a subsidiary of Columbia Gas & Electric Corpn., 61 Broadway, New York, is planning installation of natural gas pipe lines to Buena Vista, Warren, Culpeper, Manassas and marine base at Quantico, Va.

Iroquois Gas Co., Buffalo, has work under way on pipe line from Wayne-Dundee field, N. Y., to Hammondsport, Bath, Dansville, N. Y., and vicinity, to cost \$400,000.

Railroad Equipment

Only four railroad locomotives were shipped in September, according to reports from the principal manufacturing plants to the Bureau of the Census. All were steam units and were for domestic account. Shipments in August totaled 13 locomotives. Unfilled orders at the end of September, however, rose to 129 from 74 at the end of August, 105 being electric and 14 steam locomotives for domestic account and one steam unit for export.

Board of Transportation, New York, has awarded contract, subject to final approval of the Board of Estimate, for 500 steel subway cars, valued at \$10,531,500, to American Car & Foundry Co.; contract for motors, at \$2,332,500, to General Electric Co., and for electrical control equipment, at \$1,230,000, to Western Electric Co.

Chicago & Illinois Midland has ordered 250 composite and 500 gondola cars from Pullman Car & Mfg. Corpn.

Chesapeake & Ohio Railroad has awarded contract to Greenville Steel Car Co. for rebuilding of car sides and bottoms requiring 1500 tons of plates and shapes.

Naval Aircraft Factory, Philadelphia, has placed contract with Magor Car Corpn., for repairing eight flat cars.

Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York, has removed its office and service station at Seattle, Wash., to 3201 First Avenue South. C. Kirk Hillman has been appointed district manager.

The first boatload of steel ever to be shipped to Green Bay, Wis., has been received by the Northwest Engineering Co. Consignment was made from the South Chicago district.



The late Thomas A. Edison studying a laboratory experiment at Schenectady, N. Y., with the late Dr. Charles P. Steinmetz.

PRESIDENT HOOVER'S TRIBUTE TO THOMAS A. EDISON

IT is given to few men of any age, nation or calling to become the benefactor of all humanity. That distinction came abundantly to Thomas Alva Edison, whose death in his eighty-fifth year has ended a life of courage and outstanding achievement. His life-long search for truth, fructifying in more than a thousand inventions, made him the greatest inventor our nation has produced, and revolutionized civilization itself. He multiplied light and dissolved darkness; he added to the whole wealth of nations. He was great not only in his scientific creative instinct and insight but did more than any other American to place invention on an organized basis of the utilization of raw materials of pure science and discovery. He was a rare genius. He has been a precious asset to the whole world.

"Every American owes a personal debt to him. It is not only a debt for great benefactions which he has brought to every American, but also a debt for the honor he brought to our country. By his own genius and effort he rose from a newsboy and telegrapher to the position of leadership among men. His life has been a constant stimulant to confidence that our institutions hold open the door of opportunity to those who would enter. He possessed a modesty, a kindness, a staunchness of character rare among men. His death leaves thousands bereft of a friend, the nation bereft of one of its notable citizens and the world bereft of one of its greatest benefactors. I mourn his passing as a personal friend over a quarter of a century."

British Exchange Hampers Foreign Trade —Prices In Dollars, Francs and Pounds

(By Cable)

LONDON, ENGLAND, Oct. 19.

B RITISH iron and steel markets are quiet, influenced by the impending general election. Inquiry continues to improve, but important tonnages are being deferred.

Trading between the United Kingdom and the Continent is increasingly difficult, because of exchange fluctuations. A large French group has entirely withdrawn all quotations to the United Kingdom but Belgian mills are in most cases willing to contract at the current rates of the pound sterling.

One important producing and selling group in Luxemburg has withdrawn its quotations in dollars and is using only French francs. While this policy is regarded in some quarters as political, it serves as an example of Continental apprehension as to the stability of the dollar.

The International Chamber of Commerce is devising plans for settlement of difficulties, which have arisen from sterling contracts concluded prior to suspension of the gold basis, Sept. 21.

The Shanghai Chamber of Commerce reports by cable that a meeting of American, European and Japanese interests has resolved that all current contracts made in the pound sterling must be fulfilled on the basis of original terms.

An agreement for mutual barter has been reached between France and the Soviet Union, by which the latter

France reaches agreement with Soviet to exchange French products for oil and grain.

* * *

Unemployment increases in France, and Germany, and gold hoarding becomes formidable.

* * *

Belgian and German barbed wire makers plan joint sales office for United States.

* * *

Soviet sells steel in Antwerp, believed to be for purpose of depressing the market preparatory to a heavy purchase.

▼ ▼ ▼

will pay for French manufactures with oil, gasoline and grain. Meanwhile the French industrial and economic situation is rapidly growing worse. Growing unemployment is bringing decreased buying power, and private hoarding of gold as a result of general lack of confidence in the world financial situation promises to become formidable.

In Germany, the financial situation is growing worse and further large dismissals of labor are reported. Conditions in Holland are increasingly serious. Italy has bought Indian foundry pig iron and Rumanian spiegel-eisen.

Belgian supporters of a free-trade policy are protesting to the Government against its policy of protection, claiming that Belgium's position is better than elsewhere because of the absence of import duties, enabling low costs. Three more blast furnaces are being blown out.

Shipbuilding under construction in the United Kingdom at the end of the third quarter was 417,000 tons, the lowest in 44 years, and only 27.25 per cent of the world's total. New tonnage begun in the quarter totaled 38,000 tons, an increase of 15,000 tons over the second quarter.

British consumers of pig iron have bought ahead expecting an advance in prices, but makers are reluctant to enter into further extensive commitments as costs are advancing. Substantial concessions in Cleveland foundry iron prices to Scotland are no longer being granted. Export sales of pig iron are increasing, and Japanese users have bought some hematite, so that more furnaces will probably be blown in.

The position of British steel mills, however, has shown only minor improvement since suspension of the gold standard. Tin plate inquiry is good, but actual business is small, buyers generally being unwilling to pay the prices asked.

Consumers in the United States have bought some small lots of ordinary sizes of Welsh tin plate. Welsh mills are about 60 per cent active,

British and Continental European Export Prices f.o.b. United Kingdom Ports, Hamburg and Antwerp

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton, £ at \$2.85

Ferromanganese, export.	£9 0s.			\$34.65
Billets, open-hearth.	5 5	to	15 12½s.	20.21 to \$21.65
Black sheets, Japanese specifications	9 15	to	10 0	37.53 to 38.50
Tin plate, per base box (nom.)	0 11	to	0 15	2.69 to 2.87
Steel bars, open-hearth.	7 17½	to	8 7½	1.35 to 1.44
Beams, open-hearth.	7 7½	to	7 17½	1.26 to 1.35
Channels, open-hearth.	7 12½	to	8 2½	1.31 to 1.40
Angles, open-hearth.	7 7½	to	7 17½	1.26 to 1.35
Black sheets, No. 24 gage	8 5	to	8 10	1.42 to 1.46
Galvanized sheets, No. 24 gage	9 12½			1.65

Continental Prices, f.o.b. Antwerp or Hamburg

Per Metric Ton, Franc at 3.95c.

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phosph.	286 fr. 10	289 fr.	\$11.30 to \$11.42
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Billets, Thomas.	344 fr. to	350 fr.	\$13.61 to \$13.85
Wire rods, low C., No. 5 B.W.G.	585	to 615	23.09 to 24.30
Rails, light	740		29.20
Black sheets, No. 31 gage, Japanese.	1384	to 1476	54.68 to 58.32
Steel bars, merchant.	381	to 383	0.69 to 0.70
Beams, Thomas, British standard (nominal).	381	to 387	0.69 to 0.70
Channels Thomas, American sections.	689	to 701	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ¾-in. thick	378	to 384	0.68 to 0.69
Angles, Thomas, 3-in.	387	to 393	0.69 to 0.70
Hoops and strip steel over 6-in. base.	492	to 510	0.90 to 0.92
Wire, plain, No. 8 gage.	615	to 624	1.09 to 1.10
Wire, barbed, 4-pt. No. 12 B.W.G.	1045		1.87

which is an improvement of 10 to 15 per cent from the low point.

German output in September was 48,000 tons of pig iron and 593,000 tons of raw steel. Production of the Vereinigte Stahlwerke A. G. (United Steel Works), Düsseldorf, in the fiscal year 1930-1931 was 3,300,000 tons of pig iron and 3,700,000 tons of raw steel. This compares with 5,300,000 tons of pig iron and 5,500,000 tons of raw steel produced in the previous year.

Aluminum Cartel Adopts Swiss Franc

BERLIN, GERMANY, Oct. 10.—In future, the European Aluminum Cartel will quote all prices in Swiss francs. The new price is 198 Swiss francs per 100 kg., or 17.60c. a lb., but this may be reduced, as certain consumers have substantial contracts calling for payment in the pound sterling, and these may exercise a depressing influence on the market.

Japanese Sheet Piling Based on Foreign Price

YOKOHAMA, JAPAN, Sept. 21.—Following consultation with its selling agents for sheet steel piling, the Seitetsu Jo (Government Steel Works) has decided to establish its prices for this product on the basis of foreign delivered quotations. It had been suggested that this new Japanese product should be sold at a concession from the foreign price level, but the Government works has stated that its product is comparable with the foreign in both quality and design and sees no reason for lower prices.

Reduction in Ocean Freights Abandoned

HAMBURG, GERMANY, Oct. 10.—As certain non-members of the shipping conference have abandoned recent plans to place ships in service to the United States and Canada, the general reduction of 12½ to 25 per cent in ocean rates will not be made effective.

Foreign Railroads Use Diesel-Electric Engines

HAMBURG, GERMANY, Oct. 10.—A decided trend from steam to Diesel-electric locomotives is evident among railroads of the Orient. The Royal Siamese Railways, which recently ordered six 450-hp. Diesel-electric locomotives from Sulzer Brothers in Germany, has decided to replace all steam

locomotives by the end of 1937. The Burmese Railways in India are also planning to substitute Diesel-electric for steam locomotives on the entire system, following a trial order for two locomotives, placed in Germany.

Soviet Steel Sold in Antwerp

HAMBURG, GERMANY, Oct. 10.—A consignment of 61 tons of steel products from the Soviet Union has been sold in Antwerp. While this appears to be an unusual procedure for a country forced to import heavy tonnages of steel from abroad, it is suggested among European mills that the object may be to depress the market.

It is pointed out that not long ago the Russians bought a substantial number of files in Germany. These were shipped in part to India and partly to England at lower prices than had been been paid originally. These sales depressed the export market on files and the Soviet shortly afterward succeeded in buying files in Sheffield, England, and Remscheid, Germany, at 8 to 10 per cent under the former market prices. This method of bringing down prices prior to a large purchase is said to have been employed by the Soviet on cast iron bath tubs, lamps, razor blades and alloy steels.

Foreign Sales Office Planned for Barbed Wire

HAMBURG, GERMANY, Oct. 10.—Belgian and German manufacturers of barbed wire, who have booked some substantial business in recent months for delivery to the United States, especially the Middle West, are considering establishment of a joint sales office in the United States.

As many of the recent barbed wire sales, made through American importers, were at c.i.f. prices about 25 per cent lower than the f.o.b. mill quotation in the United States, the sellers here suggest that the American tariff may be increased. Establishment of a direct sales office of the mills would permit controlling prices, so that they would be only slightly under the current American market.

Foundry Equipment Orders Improved

Foundry Equipment Manufacturers' Association reports an increase in orders in September, gross bookings for that month being represented by the index figure 31.9, compared with 16.9 in August, which was the low for this year, 38.7 in July and 40.9 in June. The association derives its base 100 from the average monthly shipments of 1922, 1923 and 1924.

German Machine Tool Builders Merge

BERLIN, GERMANY, Oct. 10.—The Deutsche Niles Werke A. G. (German Niles Tool Works) has acquired six other German machine tool building companies, including the Hermann & A. Escher A. G. of Chemnitz. This makes the Niles works one of the largest in Germany.

Canada to Levy Dumping Duty on Ferromanganese

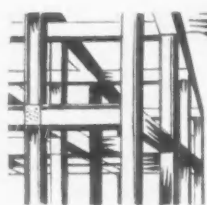
WASHINGTON, Oct. 20.—Effective Oct. 8, an order-in-council by the Canadian Minister of National Revenue established a fixed valuation of \$55 a ton, at point of production, on ferromanganese containing 30 per cent or more manganese, according to a report received by the Department of Commerce from Commercial Attache L. W. Meekins, Ottawa. Ferromanganese is admitted into Canada free of regular duty, but the order provides for the application of a dumping duty if ferromanganese is invoiced at less than \$55. The duty is equal to the difference between the fixed valuation and the lower selling price to the Canadian purchaser, not to exceed 50 per cent of the valuation should the difference be more than 50 per cent.

Canada is a producer of ferromanganese and is said to receive but small imported tonnages, most of which are reported to come from England. The United States imports more ferromanganese from Canada than it exports to that country. Exports of spiegeleisen and ferromanganese from the United States to Canada in 1930 amounted to 649 tons, and in the first eight months of 1931 they were only 137 tons.

World Shipbuilding at Lowest Point Since War

As the result of another decline in shipbuilding, the tonnage of merchant vessels under construction throughout the world not only reaches a new post-war low level, but is less than half the volume of construction under way just before the war, says a statement just issued by Lloyd's Register of Shipping, covering returns from all countries except Russia for the quarter ended Sept. 30. No Russian returns have been available for some time past.

For the United States a decrease of about 40,000 gross tons was shown during the last quarter; but a greater loss in Great Britain and Ireland leaves the United States holding second place, only about 150,000 tons behind Great Britain and Ireland, as compared with a gap of about 900,000 gross tons at this time last year.



PLANT EXPANSION AND EQUIPMENT BUYING



Some Manufacturing Plants Busier

A MODICUM of encouragement is derived by the equipment trades from the fact that many of the smaller metal-working shops are busier, and, while this improvement has not resulted in a noticeable increase in machine tool orders, it has brought about a spurt in demand for repair parts.

Some of the larger manufacturing plants are also more active. In the Philadelphia district, for example, two outstanding plants are working almost at full capacity. One is the Edward G. Budd Mfg. Co., which has started production on large orders for auto-

mobile bodies for new models, and the other is the Philco radio plant, which, in addition to its regular radio line, is making a new television set. Preparations for increased output of automobile engines by the Lycoming Mfg. Co., Williamsport, Pa., continue, and a few additional orders for machine tools have been placed by this company. Its total orders, when its program is completed, will aggregate about \$500,000, a large part of this having been placed some weeks ago.

Offsetting these favorable but spotty developments is the fact that the aggregate of machine tool business

While Orders for Shop Equipment Have Not Improved, Repair Parts are Called For

this month probably is not exceeding that of September, which was the poorest month during the period of the depression. The National Machine Tool Builders' Association announces an index figure of 56 for sales last month, compared with a previous low in this cycle of 60.4 in November, 1930. The July figure, this year, was down to 61.5, but August rose to 71.7. The three-months' moving average is now 63.1, also a new low for this period, comparing with a low of 65.3 in January, 1931. The index figure for unfilled orders dropped to 139.6, or 1.52 times shipments of last month.

NEW YORK

Whatever of hopeful feeling there is in the machine tool trade of this district is engendered mainly by a few orders that have trickled in from sources that have not been buyers of shop equipment in a long time. Another reason for a modicum of encouragement is that some of the smaller shops in this vicinity are getting busier, and, while they are not prospective buyers of equipment at this time, they are ordering repair parts. A part of the additional business to be placed by the Lycoming Mfg. Co., Williamsport, Pa., for motor manufacture has been tentatively awarded. Many machine tool engineers and salesmen have been at Williamsport for the past week or two, assisting the Lycoming organization in lining up its equipment requirements. With the large purchases that were made some weeks ago, the total of the company's new equipment will be about \$500,000.

CHICAGO

The machine tool industry has been diverted temporarily from a very quiet business week to meetings held in this city by machine tool builders and dealers' organizations. The Northern Pacific Railroad has purchased a 36-in. x 18-ft. lathe, and the Studebaker

Corpn., South Bend, Ind., has placed several small orders and in addition is having some tools rebuilt. Local dealers are taking up this rebuilding idea with fair measure of success. Some Western users who operate more than one plant are moving machines as needed from one property to another, thereby avoiding the necessity of buying new equipment.

NEW ENGLAND

There are virtually no new prospects. New England machine tool builders report a falling off in inquiries and orders.

Used tool dealers are doing a fair business, but mostly in small turret and tool room lathes, drilling equipment and grinders, and in a majority of instances on long term credit. They have almost no inquiries, sales being the result of personal contact.

Small tool sales are fairly satisfactory.

CINCINNATI

Bookings the past week included a few single orders for light machines. Interest in heavy machinery consists of an occasional inquiry. Some manufacturers are giving attention to increasing stock tools to keep factory forces employed.

MILWAUKEE

While some encouragement is found in an increasing number of inquiries, the machine tool market remains dull. Orders are few and far between, and it is difficult for tool builders to maintain even the lean production schedules of recent weeks. Calls for repair parts are increasing and in at least one instance a shop has received rush orders for air mail shipment to Detroit. Used tools are selling moderately well. Consolidation of the Milwaukee plant of Nash Motors Co. with the main works at Kenosha, Wis., is not expected to throw any equipment on the market, as the arrangement is believed to be of only a temporary nature and for immediate economies.

CLEVELAND

Machine tool orders were very light the past week and new inquiries were few. Some business that has been pending is still being held back and sales offices have little other prospective business to work on.

PITTSBURGH

Local dealers report machine tool inquiry somewhat more encouraging. Orders are principally for single tools and many repair parts are being required. In some cases old tools are



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contract from Navy Department for 16 bombing planes and spare parts at cost of \$534,662.

Buffalo

BOARD OF EDUCATION, Central Rural School District No. 1, Randolph, N. Y., plans installation of manual training shops in new central high and grade school, for which bids are being asked on general contract until Oct. 31, to cost \$290,000. Raymond A. Freeburg, 1105 West Third Street, Jamestown, N. Y., is architect. J. J. Young is president of board.

Claude-Neon Displays, Inc., 75 Bird Avenue, Buffalo, manufacturer of electric lamps and tube-lighting equipment, electric displays, etc., affiliated with Claude-Neon Lights, Inc., New York, is planning expansion at Los Angeles plant. Work is under way on additions to plant at Buffalo. Electrical Products Corp., 1128 Venice Boulevard, Los Angeles, will be in charge of work in that city.

Ora L. Dennis, 414 Broadway, and Allen H. Williams, 6 Poppy Street, Rochester, N. Y., have organized Roll-Easy Corp., and will operate plant for manufacture of mechanical equipment and appliances.

Lamoka Power Corp., Sodus, N. Y., G. R. Mills, Sodus, president, has work under way on a hydroelectric power development at Lake Keuka, N. Y., to cost over \$750,000 with transmission system. Station will be supplemented by steam-operated unit, using natural gas from Wayne, N. Y., field for generating and pumping service, including natural gas pipe line gathering system to cost about \$65,000. Company is affiliated with Tri-State Gas & Electric Corp., Elmira, N. Y., of which Mr. Mills also is president.

Philadelphia

BOARD OF EDUCATION, Administration Building, Nineteenth Street, Philadelphia, plans installation of manual training equipment in new multi-story junior high school at Fifty-ninth Street and Malvern Avenue, to cost about \$762,000, for which general contract has been let to John McShain, 1710 North Street. Board has also authorized plans for another junior high school to cost close to like sum, and will provide manual training department. Irwin T. Catharine is architect for board. Bids are being asked by Edward Merchant, secretary and business manager, until Nov. 3 for school equipment and supplies.

A. and J. Shapiro, Philadelphia, automobile parts and equipment, have leased building at 5819-23 Woodland Avenue, for new works.

Bureau of Supplies and Accounts, Navy Department, Philadelphia and Washington, will receive bids until Nov. 3 for 25 engine stands for Philadelphia navy yard; until Oct. 27 for one motor-driven high-speed heavy-duty roughing lathe, and one hardness testing machine for same yard.

Pioneer Mfg. Co., Philadelphia, has leased building at 336 North Third Street, for manufacture of electrical appliances, radio equipment and kindred specialties.

State Board of Education, Trenton, N. J., has authorized appropriation of \$411,000 for new buildings and improvements at Manual Training and Industrial

School for Colored Youths, Bordentown, including addition to present auto mechanics building, to cost \$165,000 with equipment; new steam power plant for central heating, \$175,000, and extensions in water distributing system to cost \$20,000.

Universal Broadcasting Co., 1321 Arch Street, Philadelphia, has plans for new radio broadcasting and television station, to cost over \$300,000 with power and other equipment. Gabriel B. Roth, 1629 Chestnut Street, is architect.

Board of Education, Chambersburg, Pa., contemplates installation of manual training equipment in new multi-story high school to cost about \$400,000, for which superstructure will be placed under way at once.

Glen Alden Coal Co., Scranton, Pa., has work under way on a new coal breaker at colliery at Lance, Pa., to cost over \$75,000 with equipment. S. D. Dimmick is vice-president.

Pusey & Jones Corp., Wilmington, Del., manufacturer of paper-making machinery and other equipment, is arranging for increased production and will add about 300 employees to force. Company has secured contract for book paper-making machine, 242 in. wide, with speed of 1000 ft. a min., and capacity of 75 tons of finished paper a day. Unit will be installed at plant of Champion Fibre Co., Canton, N. C., and will cost about \$500,000. It is scheduled for completion next spring. Operations will also be expanded in joiner division of Wilmington plant, following recent award for work in new ocean liners now in course of building at yards of New York Shipbuilding Co., Camden, N. J.

Cleveland

EXPANSION and improvements are under way by Midland Steel Products Co., Madison Avenue and 106th Street, Cleveland, manufacturer of automotive specialties, four-wheel brakes, etc., for facilities for production other lines of steel equipment. New equipment installation will be carried out for manufacture of new automobile axle housings, to cost close to \$100,000. Harry T. Gilbert has recently been appointed vice-president and general manager. E. J. Kulas is president.

Gledhill Road Machinery Co., Gallon, Ohio, has awarded general contract to T. J. Schirtzinger, 1353 North High Street, Columbus, Ohio, for one-story plant, 90 x 200 ft., to cost close to \$50,000 with equipment. Wallace H. Hatch, Hippodrome Annex, Cleveland, is architect. E. C. Gledhill is head.

Westinghouse Electric & Mfg. Co., East Pittsburgh, is planning removal of entire plant for manufacture of refrigerator cabinets from Springfield, Mass., to Mansfield, Ohio, where facilities will be provided for employment of about 500 operatives.

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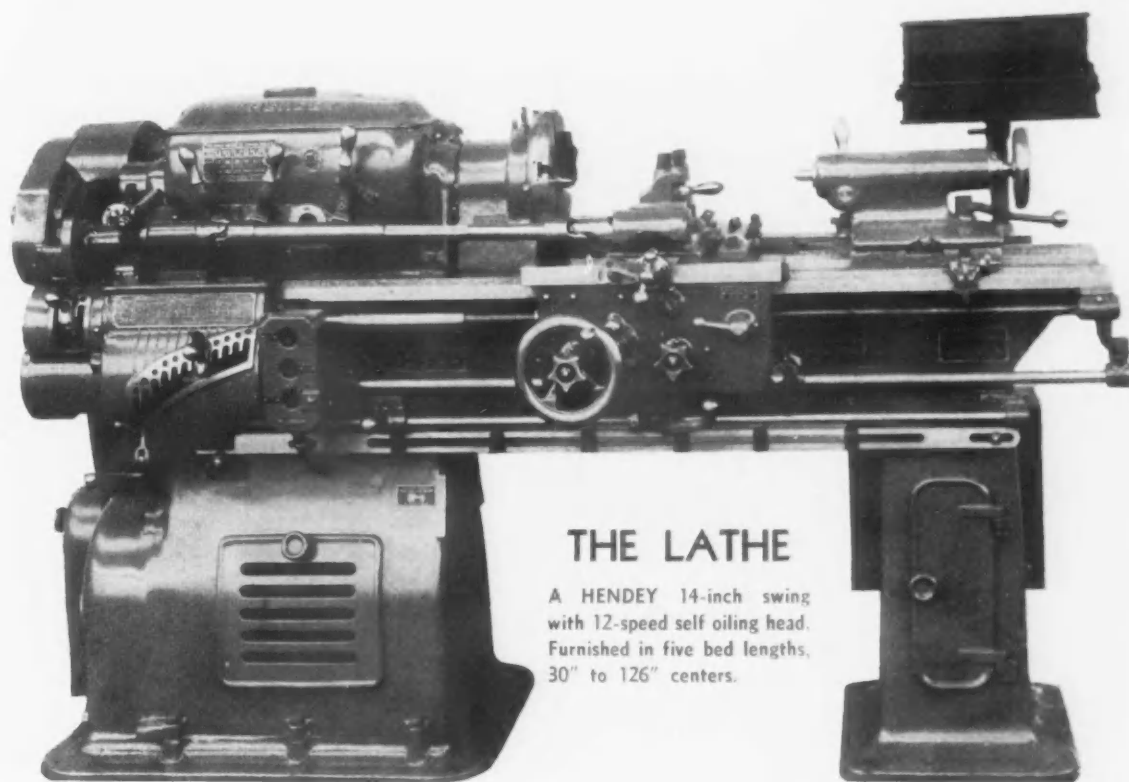
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George E. Wells, Inc., Little Rock, Ark.,

A MODERN ENGINE LATHE EQUIPPED WITH WORTH-WHILE EFFICIENCY ATTACHMENTS



THE LATHE

A HENDEY 14-inch swing
with 12-speed self oiling head.
Furnished in five bed lengths,
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ATTACHMENTS

SUB HEADSTOCK

This is a slow speed unit with a reduction from
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It has dead center.

Used for cutting long leads, (4" longest with
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MULTIPLE STOPS

For both cross slide and carriage travel; used
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RELIEVING ATTACHMENT

For relieving or backing off various forms of
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TAPER ATTACHMENT

REVERSING MOTOR DRIVE FOR POWER

SMALL TOOL CABINET ON POST

HENDEY PRECISION LEAD SCREW

HENDEY QUALITY THROUGHOUT

A Lathe Capable of Doing Lots of Dependable Work in a Quiet Way

THE HENDEY MACHINE COMPANY

TORRINGTON, CONNECTICUT

being entirely reconditioned and new buying, which had seemed a certainty a year ago, has been indefinitely postponed.

The plans of the large steel companies in this and nearby districts are largely a matter of conjecture, but reports persist that many extensive cost-saving programs are being considered which will bring large orders to equipment builders in the near future. These latter companies have taken advantage of their recent prosperity to make many changes and improvements in their own plants and are better prepared than ever to take advantage of any improvement in business.

New York

PLANS have been arranged by Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, for new three-story storage and distributing plant, 105 x 150 ft., at Jacksonville, Fla., with ovens, conveying and other equipment for baking department, to cost \$100,000. Jefferson Powell, Jacksonville, is architect.

Baird Television Corp., Paramount Building, New York, will arrange for production schedule of about 20,000 television sets weekly at new plant to be established in or near city, and will also provide facilities for extensive output of television equipment for telephone systems. John L. Baird, head of Baird Television Co. of Great Britain, Ltd., London, has arrived in United States to complete manufacturing arrangements. First-noted company is affiliated with latter organization.

Signal Supply Officer, Army Department, Army Base, Brooklyn, is asking bids until Nov. 6 for equipment required for modification of 1700 mast sections.

Fred A. Jewell, 157 West Forty-seventh Street, New York, and associates have organized Jewell Tool & Machine Works, Inc., and plan operation of factory for manufacture of tools and mechanical equipment.

William J. Maxwell, Long Island City, has leased building at corner of Bridge Plaza and Twenty-fourth Street, for machine shop and automobile repair works.

Amalgamated Paper Co., Fort Edward, N. Y., manufacturer of writing papers and other paper stocks, has asked bids on general contract for one-story addition, 50 x 150 ft., to cost over \$60,000 with equipment.

Consolidated Gas Co., 4 Irving Place, New York, is planning erection of pumping plant at artificial gas works at Hunts Point Avenue and Bronx River, to cost over \$40,000 with equipment. J. F. Hunter, is company engineer.

Savil Radio Engineering Corp., 135 Liberty Street, New York, manufacturer of radio equipment and sets, radio novelties, etc., has leased floor in building at 71-73 Grand Street for new plant.

Russell G. and Walter M. Cory, 30 Church Street, New York, architects and engineers, have filed plans for a four-story automobile service, repair and garage building, 92 x 123 ft., to cost about \$120,000 with equipment.

Lever Brothers Co., Cambridge, Mass., manufacturer of soaps, etc., has asked bids on general contract for extensions in property at Edgewater, N. J., including

two-story refining plant, 60 x 98 ft.; five-story finishing building, 65 x 177 ft.; three-story deodorizing unit, 58 x 115 ft.; one-story steam power house, 58 x 65 ft., and other structures, to cost over \$500,000 with equipment. Stone & Webster Engineering Co., 49 Federal Street, Boston, is engineer.

Karl Suchomel Co., 35 Esther Street, Newark, N. J., manufacturer of sheet metal products, has purchased adjoining property, 50 x 100 ft., for expansion.

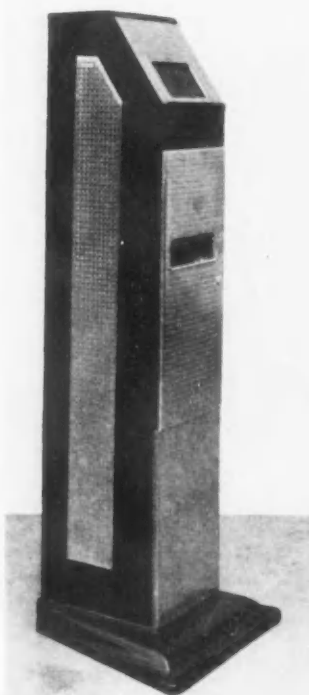
Plastic Metals Corp., Newark, N. J., care David Sarbone, 81 Wallace Street, attorney, recently organized with capital of \$125,000 by William H. Bolte and David E. Clemenson, Newark, plans operation of factory for manufacture of metal and metallic specialties.

City Council, Perth Amboy, N. J., has plans for two sewage treatment plants, consisting of settling tanks, drying beds, pumping machinery and power equipment, piping, sterilizing machinery and other mechanical equipment, to cost close to \$400,000. L. P. Booz, Jr., 263 Madison Avenue, is engineer.

John Dunn, Son & Co., export merchants, 44 Whitehall Street, New York, are in market for machines for making sheet steel pipe up to 80-in. diameter, suitable for waterworks; also equipment for removing surface dirt from water pipe.

South Atlantic

BUILDING at 11-13 East Twenty-first Street, Baltimore, has been leased by Fluid Heat, Inc., 2111 North Charles Street, manufacturer of oil burners and equipment, for new assembling plant, with



VENDING machine of lacquered steel sheets with decorative panels of Allegheny metal, which was designed and is being fabricated by the Edward G. Budd Mfg. Co., Philadelphia. High chrome nickel alloy steel is said to be desirable for decoration of such machines when they are in use near salt water.

part of space given over to storage and distributing service.

Flashlight Corp., of Virginia, Inc., Fielddale, Henry County, Va., care of Eubank & Caldwell, Inc., Boxley Building, Roanoke, Va., architect, recently organized to manufacture batteryless flashlights and equipment, has plans for one-story plant, 50 x 200 ft., at Fielddale, to cost over \$40,000 with equipment. Company is understood to be associated with a plant now manufacturing similar specialties at Freehold, N. J. C. B. Collins is president.

Board of District Commissioners, District Building, Washington, will receive bids until Oct. 29 for two lathes and one shaper for manual training department of public schools; also for erection of one-story service and garage building, 100 x 200 ft., for sewer department.

Coca-Cola Co., 1215 East Fort Avenue, Baltimore, has acquired two tracts adjoining local bottling works, totaling over 35,000 sq. ft., for expansion.

Shipping Container Corp., Cape Charles, Va., is planning early operation of new plant in leased building, recently secured, for manufacture of sheet steel collapsible barrels, kegs and kindred containers, using steel rods for upright supports. Shortly after first of year, company contemplates erection new plant, to cost over \$60,000 with equipment.

Commanding Officer, Nansemond Ordnance Depot, United States Army, Pig Point, Va., is asking bids until Nov. 11 for one 100,000-gal. capacity steel water tank and tower.

Savannah Foundry & Machine Co., Savannah, Ga., will carry out expansion and improvements, including installation of new molding machines and other equipment.

Tide Water Power Co., Wilmington, N. C., has purchased municipal electric plant and system, and waterworks at Morehead City, N. C., and will consolidate. Company is also negotiating for acquisition of similar utilities at Beaufort, N. C. Plans are under way for expansion, including transmission lines.

Georgia Forestry Association, Atlanta, Ga., T. Guy Woolford, president, and Department of Forestry and Geological Development, State House, Atlanta, have plans for semi-commercial paper and pulp mill to use Georgia slash pine as raw material at Savannah, Ga. A fund of \$70,000 is available for project. C. H. Herty, 101 Park Avenue, New York, is engineer; machinery and equipment will be purchased through last noted office.

Construction Quartermaster, Langley Field, Va., is asking bids until Oct. 26 for erection of two air corps warehouses and distributing plants, Nos. 1 and 2, at local field.

Navy Department, Washington, will transfer hangar from naval air station at Norfolk, Va., to naval air base at Lakehurst, N. J., where unit will be re-erected for service for non-rigid airships, including repair and reconditioning facilities.

Burton Machine Co., Chestnut Street, Norfolk, Va., contemplates purchase of equipment for production of metal burial cases, including presses, dies, stamping and finishing equipment.

Tallassee Power Co., Badin, N. C., has organized Carolina Aluminum Co., to operate its local aluminum works, heretofore conducted under first noted name.

Glenn L. Martin Co., Middle River, Baltimore airport, Baltimore, has secured

AMERICAN

STEEL SHEETS *for*



EVERY PURPOSE



ERECTED BY NATIONAL NEWARK AND ESSEX BANKING COMPANY

Black and Galvanized Sheets
Keystone Rust Resisting Copper Steel Sheets
Special Sheets, and U S S Stainless and Heat
Resisting Steel Sheets and Light Plates

Modern construction demands highest
grade sheet metals. This explains why
AMERICAN products were used in the new

National Newark Building Newark, New Jersey

*Architects—John H. & Wilson C. Ely, Newark, N. J.
General Contractor—Starrett Bros. & Eken, Inc., New York, N. Y.
Heating and Ventilating Contractors—
Baker, Smith & Company, New York, N. Y.*

A magnificent structure such as this
naturally demands that each feature of its
construction employ good materials, with
expert craftsmanship, and bear closest
scrutiny. To meet the most exacting stand-
ards, over 250,000 pounds of

Apollo Best Bloom Galvanized Sheets

and AMERICAN Black Sheets were used in
the heating and ventilating systems of this
building. Send for our APOLLO booklet.

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY

PRINCIPAL SUBSIDIARY
COLUMBIA STEEL COMPANY
CYCLONE FENCE COMPANY
ILLINOIS STEEL COMPANY



MANUFACTURING COMPANIES:
FEDERAL SHIP'LDG. & DRY DOCK CO.
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY

OIL WELL SUPPLY COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & RAILROAD CO.
UNIVERSAL ATLAS CEMENT COMPANY

Pacific Coast Distributors—Columbia Steel Company, Russ Bldg., San Francisco, Calif.

Export Distributors—United States Steel Products Company, 30 Church St., New York, N. Y.

contract from Navy Department for 16 bombing planes and spare parts at cost of \$534,662.



Buffalo

BOARD OF EDUCATION, Central Rural School District No. 1, Randolph, N. Y., plans installation of manual training shops in new central high and grade school, for which bids are being asked on general contract until Oct. 31, to cost \$290,000. Raymond A. Freeburg, 1105 West Third Street, Jamestown, N. Y., is architect. J. J. Young is president of board.

Claude-Neon Displays, Inc., 75 Bird Avenue, Buffalo, manufacturer of electric lamps and tube-lighting equipment, electric displays, etc., affiliated with Claude-Neon Lights, Inc., New York, is planning expansion at Los Angeles plant. Work is under way on additions to plant at Buffalo. Electrical Products Corp., 1128 Venice Boulevard, Los Angeles, will be in charge of work in that city.

Ora L. Dennis, 414 Broadway, and Allen H. Williams, 6 Poppy Street, Rochester, N. Y., have organized Roll-Easy Corp., and will operate plant for manufacture of mechanical equipment and appliances.

Lamoka Power Corp., Sodus, N. Y., G. R. Mills, Sodus, president, has work under way on a hydroelectric power development at Lake Keuka, N. Y., to cost over \$750,000 with transmission system. Station will be supplemented by steam-operated unit, using natural gas from Wayne, N. Y., field for generating and pumping service, including natural gas pipe line gathering system to cost about \$65,000. Company is affiliated with Tri-State Gas & Electric Corp., Elmira, N. Y., of which Mr. Mills also is president.



Philadelphia

BOARD OF EDUCATION, Administration Building, Nineteenth Street, Philadelphia, plans installation of manual training equipment in new multi-story junior high school at Fifty-ninth Street and Malvern Avenue, to cost about \$762,000, for which general contract has been let to John McShain, 1710 North Street. Board has also authorized plans for another junior high school to cost close to like sum, and will provide manual training department. Irwin T. Catharine is architect for board. Bids are being asked by Edward Merchant, secretary and business manager, until Nov. 3 for school equipment and supplies.

A. and J. Shapiro, Philadelphia, automobile parts and equipment, have leased building at 5819-23 Woodland Avenue, for new works.

Bureau of Supplies and Accounts, Navy Department, Philadelphia and Washington, will receive bids until Nov. 3 for 25 engine stands for Philadelphia navy yard; until Oct. 27 for one motor-driven high-speed heavy-duty roughing lathe, and one hardness testing machine for same yard.

Pioneer Mfg. Co., Philadelphia, has leased building at 336 North Third Street, for manufacture of electrical appliances, radio equipment and kindred specialties.

State Board of Education, Trenton, N. J., has authorized appropriation of \$411,000 for new buildings and improvements at Manual Training and Industrial

School for Colored Youths, Bordentown, including addition to present auto mechanics building, to cost \$165,000 with equipment; new steam power plant for central heating, \$175,000, and extensions in water distributing system to cost \$20,000.

Universal Broadcasting Co., 1321 Arch Street, Philadelphia, has plans for new radio broadcasting and television station, to cost over \$300,000 with power and other equipment. Gabriel B. Roth, 1629 Chestnut Street, is architect.

Board of Education, Chambersburg, Pa., contemplates installation of manual training equipment in new multi-story high school to cost about \$400,000, for which superstructure will be placed under way at once.

Glen Alden Coal Co., Scranton, Pa., has work under way on a new coal breaker at colliery at Lance, Pa., to cost over \$75,000 with equipment. S. D. Dimmick is vice-president.

Pusey & Jones Corp., Wilmington, Del., manufacturer of paper-making machinery and other equipment, is arranging for increased production and will add about 300 employees to force. Company has secured contract for book paper-making machine, 242 in. wide, with speed of 1000 ft. a min., and capacity of 75 tons of finished paper a day. Unit will be installed at plant of Champion Fibre Co., Canton, N. C., and will cost about \$500,000. It is scheduled for completion next spring. Operations will also be expanded in joiner division of Wilmington plant, following recent award for work in new ocean liners now in course of building at yards of New York Shipbuilding Co., Camden, N. J.



Cleveland

EXPANSION and improvements are under way by Midland Steel Products Co., Madison Avenue and 166th Street, Cleveland, manufacturer of automotive specialties, four-wheel brakes, etc., for facilities for production other lines of steel equipment. New equipment installation will be carried out for manufacture of new automobile axle housings, to cost close to \$100,000. Harry T. Gilbert has recently been appointed vice-president and general manager. E. J. Kulas is president.

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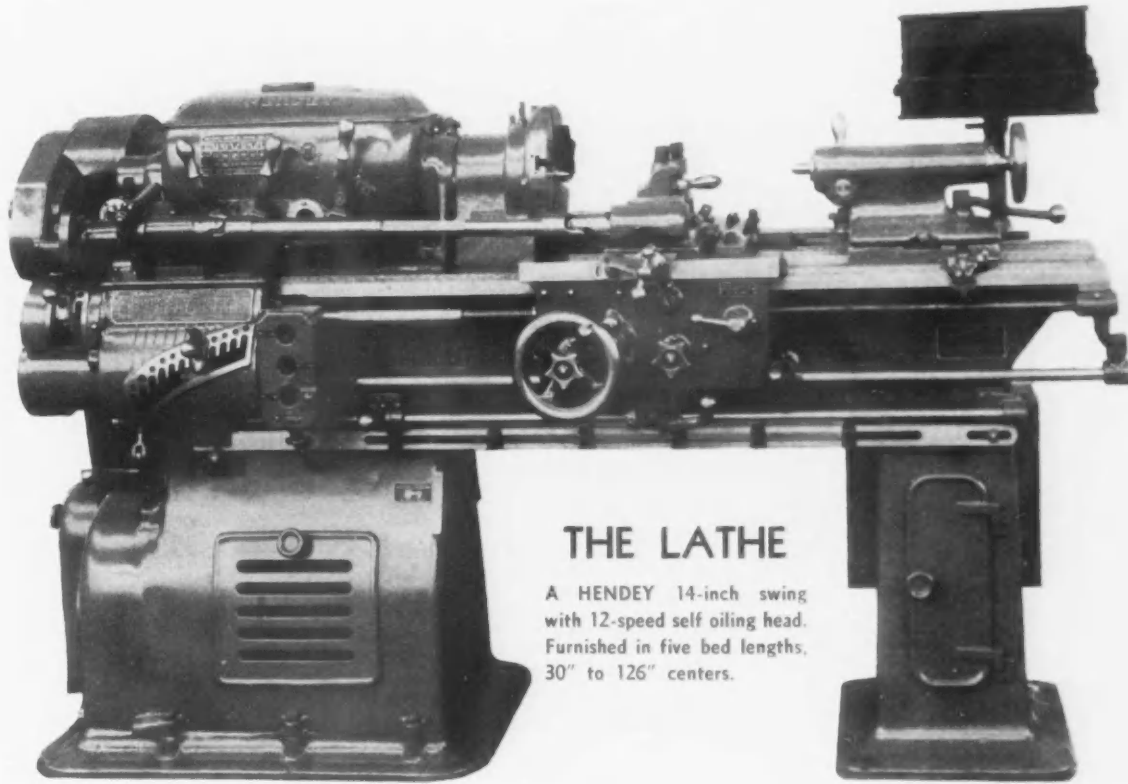
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TORRINGTON, CONNECTICUT

is planning erection of an electric-operated ice-manufacturing plant at Muskogee, Okla., to cost over \$110,000 with machinery.

Chicago, Rock Island & Pacific Railroad Co., is increasing production at car and locomotive shops at Shawnee, Okla., and about 300 men have been reinstated. Shops will operate on a five-day week basis.

Sieloff Packing Co., 4329 Natural Bridge Avenue, St. Louis, plans erection of a three-story and basement addition, 75 x 80 ft.

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Pittsburgh

PLANT of Murphy Furnace & Foundry Co., Seventeenth Street and Second Avenue, Beaver Falls, Pa., heretofore given over to production of iron castings, has been leased by Wilkofsky Brothers, Inc., Beaver Falls, for similar line of output.

Pittsburgh Reflector Co., Bowman Building, Pittsburgh, manufacturer of light reflectors, etc., has arranged with Wilson Illumination Co., Ltd., Toronto, Ont., for manufacture of its line of products in that city. Wilson company will carry out developments, and begin production early in November.

Standard Oil Co. of Pennsylvania, Inc., Peoples Gas Building, Pittsburgh, has awarded general contract to Wilson Construction Co., Johnstown, Pa., for bulk oil storage and distributing plant at Johnstown, with automobile service and garage unit, to cost close to \$90,000 with equipment.

Continental Coal Co., Westinghouse Building, Pittsburgh, has leased 621 acres of coal lands in Cass County, near Morgantown, W. Va.; in accordance with terms of agreement, Continental company will mine at least 100,000 net tons of coal for next three years. Company has also secured part of property of Bertha-Consumers Co., Pittsburgh, in same district, totaling over 400 acres, and will develop. Plans are under consideration for installation of large coal mining plant, including conveying, hoisting, loading and other equipment.

United States Engineer Office, Pittsburgh, is asking bids until Nov. 11 for surplus Government equipment at United States boatyards at West Monessen, Pa., and at Government supply depot, Lock No. 2, Ohio River, Neville Island, Pittsburgh, including machine equipment, electric and contractors' supplies, engines, pumps, hoisting machinery, automobile accessories and other equipment.

Milwaukee

OPERATIONS of Milwaukee plant of Nash Motors Co. are being transferred to main works at Kenosha, Wis., as a measure of economy, but local shop is not for sale and doubtless will be reopened when manufacturing demands make it advisable. Consolidation eliminates expense of transporting forgings, castings, stampings and some bodies from Kenosha plant to Milwaukee and facilitates concentration of key men. At its peak in 1929 Milwaukee plant employed 2200. Branch plant at Racine, Wis., is being continued in operation.

Hayssen Mfg. Co., Sheboygan, Wis., manufacturer of bread-wrapping machinery, has plans by W. C. Weeks, Inc., local architect, for two-story shop addition, including boiler room extension.

Common Council, Oconto, Wis., takes possession of Oconto Power & Light Co. plant Jan. 1 and will make improvements costing \$61,000, and including electrification of part of plant. Engineers are Gordon & Bulot, 53 West Jackson Boulevard, Chicago. P. T. Meeuwse is city clerk.

Village Board of Grafton, Wis., has extended from Oct. 17 to Oct. 23 date of closing bids for construction of sewage disposal plant and sewage re-lift station costing about \$30,000. Robert P. Zaun is village clerk.

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Chicago

PLANs have been filed by Chicago Ship Building Co., Calumet Avenue and 101st Street, for one-story extension, 29 x 192 ft.

Board of Education, Peoria, Ill., plans installation of manual training equipment in new multi-story Theodore Roosevelt Junior High School, to cost over \$600,000, for which general contract has been let to Jobst & Sons Co., Lehmann Building.

Water, Light and Power Commission, Biwabik, Minn., L. E. Chellew, secretary, has rejected bids recently received for a municipal electric light and power plant. It is proposed to ask new bids later.

Mechanical Plating Co., Chicago, has been organized with capital of \$25,000 to take over and expand company of same name, with metal plating works at 1522 West Austin Avenue. Oscar Anderson and George S. Westerberg head new company.

Republic Coal Co., Zap, N. D., is planning to rebuild coal tippie at local mining properties, recently destroyed by fire, with loss of about \$30,000 including equipment.

City Council, Detroit Lakes, Minn., is

asking bids until Oct. 26 for three horizontal centrifugal pumps and auxiliary equipment for municipal water service. Wolff & Coates, Globe Building, St. Paul, Minn., are consulting engineers.

Rognes Brothers, Madison, S. D., meat packers, will soon begin superstructure for a new one-story plant, to cost over \$35,000 with equipment.

United States Engineer Office, First District, Chicago, will receive bids until Oct. 30 for three control stations at locks at Lockport, Marseilles and Starved Rock, respectively, on Illinois River.

Grigsby-Grunow Co., 5801 Dickens Avenue, Chicago, manufacturer of radio equipment, is advancing production, with present output on basis of 4125 complete sets daily, or close to 1000 sets more than in August. A larger working force has been engaged.

Following announcement that Jefferson Electric Co., Chicago, will erect a new plant in Bellwood, THE IRON AGE is informed that new structure is now being built at a cost of about \$550,000. Building will house company's two Chicago plants and take care of its entire business, with exception of its subsidiary in Toronto. About 1800 persons are employed and new plant will have facilities for 3000 workers. Chief products of company include transformers, such as are used for bells, signal systems, electrical toys, oil burners, radio receivers and neon signs, electrical fuses, automobile ignition coils and other electrical products.

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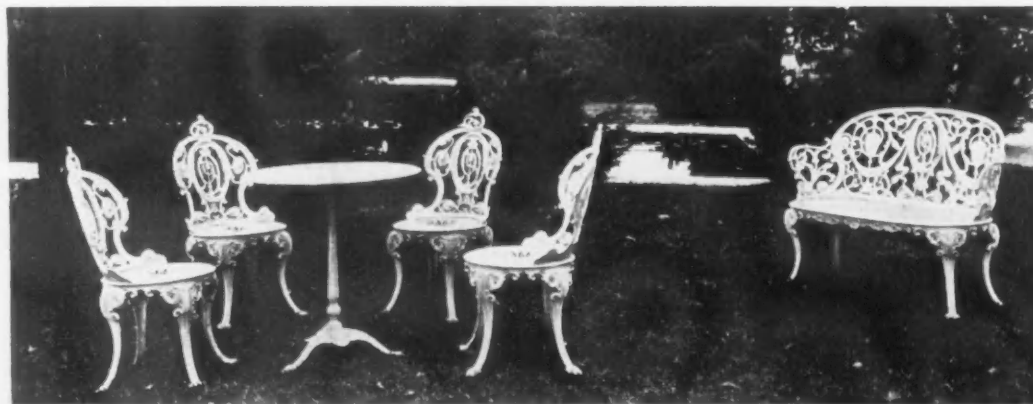
New England

PLANs have been completed by Board of Trustees, Williams College, Williamstown, Mass., for a one-story power plant, to cost about \$50,000 with equipment. Densmore, LeClear & Robbins, 31 St. James Avenue, Boston, are architects.

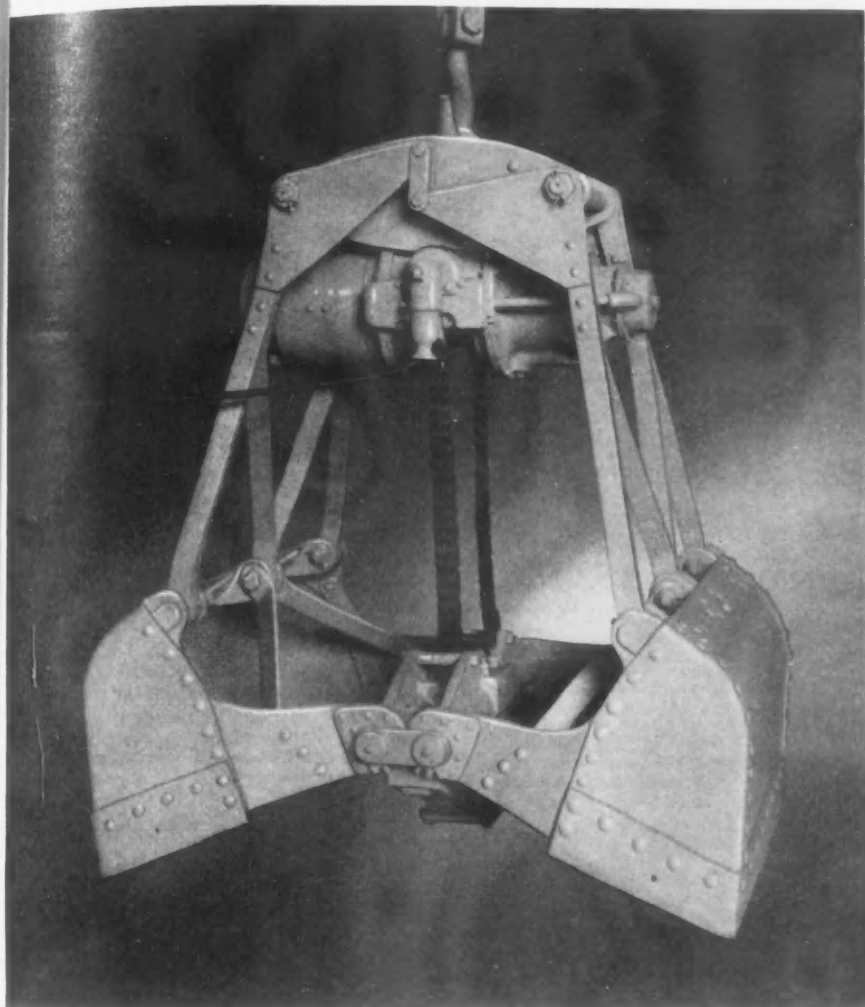
Duparquet Range Co., Boston, has been organized to manufacture ranges, steam tables, coffee urns and kindred products. It is understood that company will take over Duparquet, Huot & Moneuse Co., with plant at 511 Atlantic Avenue. George P. Ahner is president and Thomas A. Clear, 89 Bromfield Road, treasurer.

White Bus Line Corp., 4490 Main Street, Bridgeport, Conn., contemplates installation of traveling crane and other equipment in one-story addition to motor bus service and garage building, 80 x 120 ft., to cost over \$65,000 with equipment. L. Ashelm, 211 State Street, is architect.

Air-White Co., Boston, has leased floor in building at 15 Wharf Street, for produc-



METAL garden furniture has been in vogue for centuries. The Walker Machine & Foundry Corp., Roanoke, Va., goes back to the seventeenth century for the designs of garden furniture made of cast aluminum. The company has also made ornamental bird baths and dogs and frogs from the same metal.



TRADE HAYCO MARK

ELECTRIC MOTOR
ORANGE PEEL
CLAM SHELL
DRAG LINE

Finest, most modern equipment for the foundry

LET a Hayward Electric Motor Clam Shell be a bucket-of-all-work in your plant. Use it to handle one material after another, foundry sand, slag, coal, coke, iron ore or scraps.

This handy, versatile bucket is the finest, most modern equipment for the foundry. Simply hang it on the crane or hoist-hook, plug in the electric cable, and the bucket is

ready for work. Easy to run, any regular crane operator can use it.



Hayward Electric Motor Bucket shown is unloading foundry materials from cars.



Hayward Electric Motor Bucket handling sand in the foundry of a prominent automobile manufacturer.

THE HAYWARD COMPANY, 46-50 Church St., New York, N. Y. Cleveland—Chicago—San Francisco

Hayward Buckets

tion of clothes-washing equipment, dish-washing machines, parts, etc.

Donnell & Mudge Co., Canal Street, Salem, Mass., manufacturer of asbestos shingles and kindred products, has awarded general contract to Pitman & Brown Co., 11 Washington Street, for two-story plant unit, to cost close to \$30,000 with equipment.

R. J. G. Crouch, 38 South Angell Street, Providence, R. I., and associates have organized Crouch-Bolas Mfg. Co., Inc., to operate plant for manufacture of aircraft and parts. Harold Bolas and Lawrence J. McCarthy, both of Providence, will be officials of company.

Warren Telechron Co., Ashland, Mass., manufacturer of electric clocks, parts, etc., has authorized increased production schedule and will add to working force for a second shift, each shift to operate on a six-day week basis.

One bid, \$157,000 was submitted to Boston Transit Commission for fans to be used in East Boston tunnel, which was rejected. Bids will be asked again on date to be announced later.

Peck, Stow & Wilcox Co., Southington, Conn., manufacturer of builders' hardware, hammers, pruning shears, etc., will move most of its Cleveland plant equipment to Southington, where departments are being revamped. Additional equipment may be purchased. Manufacture of builders' hardware will continue at Cleveland.

Gulf States

BOARD of Education, San Antonio, Tex., plans call for bids on general contract early in January for two-story South Side Senior High School, to cost over \$600,000 with manual training and other equipment. Ralph H. Cameron, Majestic Building; George Willis, Builders Exchange Building, and Herbert S. Green, Morris Plan Bank Building, are associated architects. W. E. Simpson Co., Milam Building, is consulting engineer.

J. B. Hamman & Son, Paris, Tex., manufacturers of wire-bound boxes, crates and other containers, have organized Waco Box Co., a subsidiary, to erect a plant for production of egg crates and other containers at Waco, Tex., to cost close to \$40,000 with equipment.

City Council, Beaumont, Tex., will soon begin erection of a municipal rice terminal, storage and distributing plant to cost over \$60,000 with conveying and other handling equipment.

Board of Trustees, Tuskegee Normal and Industrial Institute, Tuskegee, Ala., has asked bids on general contract for three-story and basement Thomas A. Edison science and industrial building, 61 x 165 ft., to cost about \$200,000 with electrical and mechanical equipment. Taylor & Persley are school architects; Fosdick & Hillmer, Union Trust Building, Cincinnati, are consulting engineers.

Department of Water, Beaumont, Tex., has plans for steel water tank and tower, to cost about \$40,000. R. C. Black, Beaumont, is engineer.

Fleming & Sons, Inc., Dallas, Tex., operating Oak Cliff Paper Mills, will establish new plant at 4100 Commerce Street, where space totaling 25,000 sq. ft. has been secured for manufacture of cardboard boxes and containers, corrugated paper box specialties, egg case fillers, etc.

Construction Quartermaster, Barksdale

Field, Shreveport, La., has awarded contract to W. Murray Werner, Commercial Bank Building, for erection of four hangars, assembling shop, storage and distributing unit and air corps hangar wing operation building, at \$275,800.

East Texas Refining Co., Longview, Tex., has approved plans for new storage and distributing unit to provide for initial capacity of 80,000 gal. of gasoline.

Crystal Springs Sand & Gravel Co., Crystal Springs, Miss., is considering installation of additional equipment, including pumping machinery, conveying equipment, pipe lines, etc.

City Council, Ocala, Fla., will soon begin expansion and improvements at municipal electric light and power plant, with installation of Diesel engine-generator unit and auxiliary equipment. C. T. Baker, Ocala, is consulting engineer.

Central Power & Light Co., San Antonio, Tex., has work under way on a new electric generating plant on main canal system of Quemado Valley Irrigation project in Maverick County, near Eagle Pass, Tex., to cost over \$200,000 with equipment.

Indiana

PLANS are being considered by City Council, Warsaw, for a municipal electric light and power plant, to cost close to \$300,000 with equipment and distributing system.

Graham-Paige Motors Corp., Detroit, is arranging for transfer of two plant units at Evansville, including sub-assembling department, to works at Wayne, Mich., where production will be concentrated. It is proposed to have new units ready for service at Wayne in November.

Air-Craft Corp. of America, Inc., Portland, recently organized with capital of \$400,000 and 8000 shares of common stock, no par value, by Harry Severin, Portland, and associates, plans operation of plant for manufacture of airplanes and parts. Grim Welch and Roy C. Fulcher, Portland, are interested in company.

Century Air Lines, Inc., 5062 West Sixty-third Street, Chicago, operating an air transport service, has arranged with Board of Works, Indianapolis, for use of Indianapolis airport in connection with new network of Mid-Western cities. It is planned to establish hangar with repair facilities at Indianapolis terminus.

Board of Education, Tangier, contemplates installation of manual training equipment in new two-story high and grade school, to cost about \$160,000, for which general contract has been let to C. Anstead Co., Clinton.

Announcement is made by officials of Wayne Pump Co., Fort Wayne, that company's plant at Rochester, Pa., known as Fry division, will be moved to Fort Wayne. New building will be erected and operations will begin about Dec. 1.

Detroit

GENERAL contract has been awarded by Evans Products Co., Inc., Union Trust Building, Detroit, manufacturer of automobile loading equipment, etc., to Artley Co., 504 East Bay Street, Savannah, Ga., for one-story plant at Savannah for production of a patented circular crate for shipping citrus fruits, etc., to cost over \$45,000 with equipment.

McInerney Spring & Wire Co., Grand Rapids, Mich., recently organized to manufacture springs for automobile seats, theater seats and kindred service, has acquired property and equipment, exclusive of real estate of National Marshall Spring Corp., 700 Wealthy Street, S. W. Company has taken short-term lease at site noted, planning to remove to larger quarters in near future. P. C. Johnson will be assistant manager and general superintendent.

Marks-Perry Steel Corp., 300 South Artillery Avenue, Detroit, recently organized with capital of \$50,000 by Leo E. Marks, 1795 Parkside, and Dare E. Perry, Pontiac, Mich., plans operation of steel and iron works, with fabricating facilities.

Grand Trunk Western Railway Co., Muskegon, Mich., plans installation of hoisting, conveying and other mechanical handling equipment in connection with new dock on local waterfront, 1800 ft. long and 570 ft. wide, for which general contract has been let to Edward E. Gilles Co., 626 East Wisconsin Avenue, Milwaukee, to cost \$250,000.

Dunn Sulphite Paper Co., Port Huron, Mich., has work under way on one-story addition to mill, to cost about \$30,000 with equipment.

Goodyear Tire & Rubber Co., Akron, Ohio, has awarded general contract to Buck Construction Co., Muskegon, Mich., for factory branch, storage and service building at Muskegon, to cost over \$65,000 with equipment.

Detroit Aircraft Corp., 115 Campau Street, Detroit, has secured contract from War Department, Washington, for five pursuit planes and parts, at cost of \$172,609, and will advance production at plant.

Cincinnati

CONTRACT has been let by Premier Rubber Co., Dayton, Ohio, to Daniel Hunt Co., 1530 East First Street, for one-story plant, 60 x 100 ft., to cost close to \$50,000 with equipment. Geyer & Neuffer, Ludlow Arcade Building, are architects.

Contracting Officer, Wright Field, United States Air Corps, Dayton, Ohio, will receive bids until Nov. 2 for one-gas-fired heat-treating furnace; until Nov. 4 for two balloon winches.

Queen City Bread Co., Cincinnati, plans installation of traveling ovens, mixers, conveying machinery and other equipment in new three-story and basement baking plant, to cost about \$250,000 with equipment. General contract has been let to Hillsmith & Co., Winters Bank Building, Dayton, Ohio, who are also engineers for work.

Vulcan Iron Works, Inc., Memphis, Tenn., plans rebuilding part of plant recently destroyed by fire, with loss at close to \$55,000 with equipment.

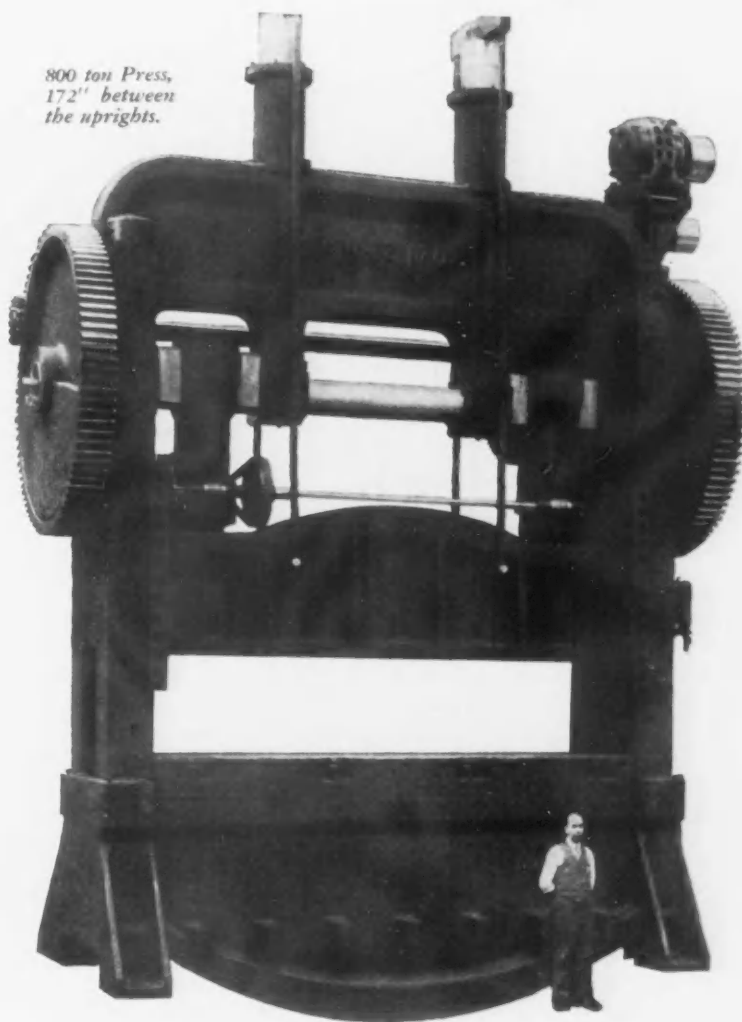
State Board of Education, Nashville, Tenn., has secured low bid on general contract from Angle-Blackford Co., American Bank Building, Greensboro, N. C., for three-story and basement industrial art school, at \$104,350. Marr & Holman, Stahlman Building, are architects.

State Department of Public Welfare, Ninth and Oak Streets, Columbus, Ohio, is asking bids until Oct. 30 for a steel water tower for installation at Massillon State Hospital, Massillon. John McSweeney is director.

City Council, Eaton, Ohio, will secure

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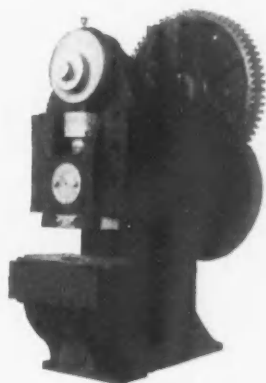
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DETROIT NEW YORK



vote of citizens at general election, Nov. 3 on bond issue for \$330,000, fund to be used for municipal electric light and power plant.

Constructing Quartermaster, Wright Field, Dayton, Ohio, is asking bids until Oct. 27 for air corps hangar at Fairfield air depot, Fairfield, with repair and reconditioning department.

Following recent acquisition of Stacey Mfg. Co., Elmwood, Cincinnati, operating a plate and structural works for manufacture of gas tanks and holders, by International-Stacey Corp., Columbus, Ohio, manufacturer of kindred plate and metal products, plans are under way by latter organization for increased output at Cincinnati works, giving employment to about 200 additional operatives.

Baltimore & Ohio Railroad Co. is increasing operations at car shops at Newark, Ohio, and has reinstated a number of men in foundry. Additional operatives will be added soon.

Pacific Coast

PLANS are being completed by San Joaquin Light & Power Corp., Fresno, Cal., for new steam-operated electric generating plant at Herndon, Cal., to cost over \$2,000,000 with transmission lines and power substations. Company is a subsidiary of Pacific Gas & Electric Co., San Francisco. Last-noted company has asked bids for a one-story equipment storage and distributing plant at Colusa, Cal.

Board of Education, Los Angeles, has completed plans for three-story addition, 48 x 312 ft., to Virgil Junior High School, larger part of building to be equipped for a vocational training shop. Work will cost about \$100,000. Sumner P. Hunt, Laughlin Building, is architect.

H. P. Garin Co., 405 Sansome Street, San Francisco, is planning to rebuild food products packing plant at Brentwood, Cal., recently destroyed by fire, with loss of about \$50,000 including equipment.

San Gabriel Valley Pre-Cooling & Icing Corp., Covina, Cal., has plans for a two-story and basement ice-manufacturing, precooling and car-icing plant, 100 x 325 ft., to cost over \$250,000 with ice-making and refrigerating machinery, mechanical blowers, conveying and other equipment. Gay Engineering Corp., 2650 Santa Fe Avenue, Los Angeles, is engineer.

Fields Chemical Corp., Long Beach, Cal., John D. Fields, president, has engaged Roy D. Van Alstine, 410 East Ninth Street, architect, to prepare plans for first unit of new plant for manufacture of industrial chemicals, one story, 150 x 180 ft., with pumping station and other units, to cost over \$80,000 with equipment.

Boeing Airplane Co., 320 West Front Street, Seattle, manufacturer of multi-passenger transport airplanes, has awarded general contract to Austin Co., Dexter-Horton Building, for three one-story additions to welding, brazing and machine shops, respectively 20 x 200 ft., 40 x 200 ft., and 40 x 200 ft., to cost over \$50,000 with equipment.

Olympic Foundry Co., Seattle, is completing establishment of new department for production of light castings, including plumbing specialties, oil burner parts, etc.

General Machinery Co., Spokane, Wash., has acquired site of former factory of Armstrong Ice Machinery Co., and contemplates early erection of one-story

plant and foundry for production of iron castings, die castings, etc., to cost about \$30,000 with equipment.

Dry Refrigeration, Inc., San Bernardino, Cal., care of Stone & Webster Engineering Corp., 601 West Fifth Street, Los Angeles, Cal., has plans for a new dry ice-manufacturing plant about 19 miles from San Bernardino, to cost about \$150,000 with machinery. Company is headed by H. E. Weiss, San Bernardino, who is identified with a limestone producing plant near site of new project, and which will be operated in conjunction with limestone works. Engineering company noted will be in charge.

Steel Tank & Pipe Co., Portland, Ore., has received enough orders to keep it busy for next five months, according to a report by Thomas Hanning, president, to F. J. Danaber, secretary of United Metal Trades Association of Pacific Northwest. Orders will necessitate addition of about 100 skilled mechanics to company payroll, it was stated.

Foreign

EQUIPMENT purchases are being arranged by South African Iron & Steel Co., Cape Town, South Africa, for plant in iron ore fields in Pretoria, South Africa, and it is proposed to have unit ready for service in 1932. Entire project will cost over \$1,000,000. Company has awarded contract for electrical equipment to Swedish General Electric Co., known as ASEA, Vasteras, Sweden, at cost of 1,800,000 kroner (about \$482,400).

Compania Cubana de Electricidad, Havana, Cuba, is planning to rebuild equipment storage and distributing plant

recently destroyed by fire, with loss close to \$200,000 including equipment. Company is a subsidiary of Electric Bond & Share Co., 2 Rector Street, New York.

Soviet Russian Government, Moscow, has authorized erection of new plant at Nizhni Tagil in Ural district, for building railroad cars, particularly freight and tank cars. Plant will have annual capacity of 55,000 complete car units, and will cost over \$5,000,000 with machinery. Site is near steel plant now in course of erection at Nizhni Tagil. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Central Electricity Board, London, England, has arranged for bond issue of £1,000,000 (about \$4,860,000), part of proceeds to be used for expansion and improvements in power plants and transmission lines.

American & Foreign Power Co., 2 Rector Street, New York, a subsidiary of Electric Bond & Share Co., same address, is negotiating with Ministries of Finance and Interior, Bucharest, Rumania, for purchase of power plants and transmission systems in country, including concessions for light and power at Bucharest and other points. Purchasing company will carry out expansion.

Transamerican Airlines Corp., 5214 West Sixty-third Street, Chicago, has applied to Prime Minister, Copenhagen, Denmark, for permission to erect an airport on Faroe Islands and west coast of Greenland, including hangars, machine shops, oil storage and distributing buildings and other field units. Station will be used in connection with airmail route from United States and Canada, with terminus at Copenhagen. Company is a transport subsidiary of Thompson Aero-nautical Corp., Union Trust Building, Cleveland.

New Trade Publications

Flexible Couplings.—Clark Coupling Co., 149 Church Street, New York. Folder illustrates "triplex" couplings providing maximum bores from 1 to 5-in.; "simplex" type for bores from 1/2 to 2 1/2 in.; also bronze units for marine use, obtainable for maximum bores from 1 to 3 in. Couplings are of double type with leather liners or facings to cushion shocks and eliminate noise.

Water Pumps.—Aluminum Industries, Inc., Cincinnati. Circulating water pumps for automobile engines are listed according to progressive sizes in new catalog for jobbers, intended to place this line on the same basis as other replacement parts.

Pipe Tools.—Borden Co., Warren, Ohio. Condensed catalog No. 32 of eight pages, describing Beaver pipe tools, including threading machines and motors, die holders, ratchet stocks, geared stocks, cutters, etc.

Machinists' Tools.—Brown & Sharpe, Providence, R. I. Attractive four-page folder emphasizes accuracy of the company's products of various types.

Welding Equipment.—Torchweld Equipment Co., 224 North Carpenter Street, Chicago. Pocket size booklet, devoted to gas welding and cutting torches, welding rod and accessories.

Pipe Tools and Fittings.—Parker Appliance Co., 10320 Berea Road, Cleveland. Tube fabricating equipment, including flaring and straightening tools and pipe benders are covered in bulle-

tin No. 28. Bulletin No. 29 is devoted to condensation coils, and bulletin No. 32 illustrates pad tube couplings, bulk-head fittings and clips.

Thrust Bearings.—Kingsbury Machine Works, Frankford, Philadelphia. Bulletin HV, 40 pages, on Kingsbury self-aligning, equalizing thrust bearings. Superseding previous Bulletins D, E, and parts of G, it combines in one booklet vertical and horizontal thrust bearings with parts which are to a large extent interchangeable. Capacities, weights and principal dimensions are given for the usual forms of the bearings. Special mention is made of the variety of standard bearing mountings available, most of which include an adjacent journal bearing and automatic lubrication for the unit.

Steel Piling.—Jones & Laughlin Steel Corp., Pittsburgh. Bulletin B designed to assist engineers and users of steel piling to a clear and comprehensive understanding of this company's sections. The booklet is amply provided with photographs and diagrams of various installations and applications.

Lock Washers.—Shakeproof Lock Washer Co., division of Illinois Tool Works, 2501 North Keeler Avenue, Chicago. Four-page folder illustrating features of "Shakeproof" twisted tooth washers.

Pumps.—DeLaval Steam Turbine Co., Trenton, N. J. Catalog B-2 describes and illustrates single-stage, double-

Where

extra weight

means

Bigger Production

When you compare the upper works of board drop hammers, you see why forgers have found their ERIES "unequalled for steady service."

The ERIE's upper works are about 19% heavier. That means steadier performance—a 9% decrease in shut-down time. (Average of users' reports.)

Built for Lower Costs

Note the extended box-section frame (originated on the ERIE Steam Hammer) which provides extra strength to resist shocks. Oversize guides give a big extra margin of bearing surface—perfect ram alignment—a full-weight blow on the forging.

Leading forge shops have standardized on ERIE Hammers because they turn out the work with fewer blows.

Our engineers will be glad to cooperate with you; write us.



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▲ ▲ Business as Others See It

Digest of Current Financial and
Economic Opinion

AVOID all manner of nostrums. This advice comes from all directions. It relates to untried "isms" for curing the patient of the current depression.

Annalist lists several things from which we should pray to be delivered: "Public dole, employment guarantees by public authority, pensions paid from the public purse; in general, everything which falls in line with what is recognized as good Socialist doctrine."

While the increase in the rediscount rate is liberally applauded, *New York Times* warns us against the possibility of higher interest and tax rates, from which "the handicaps to reviving business must be considered very severe." But the rise in the rediscount rate "marked the end of the easy-money policy of the [Federal Reserve] System, which had failed completely in its purpose of stimulating business recovery."

So, also *Annalist* refers to the "futile easy-money policy adopted last year." And *Financial Chronicle* blames that policy, in part, for the fact that now "the United States is being drained of its supplies of gold in the same way as Germany was drained in the first instance and later Great Britain."

"A large part of our unreasoning fear," says that journal, "must be ascribed to the mistaken policy of our Federal Reserve System. The Reserve authorities have insisted in participating in all the European financial involvements, when they ought to have held rigidly aloof." All of the credits we extended have, it is urged, been "non-liquid from the start."

That paper doubts the efficacy of the much-lauded Hoover plan for easing pressure on some of the less liquid American banks. It

suggests that the "frozen assets," when transferred to the National Credit Corp., may "freeze again. . . . No rediscount ever converted a bad note into a good one."

But others think differently. Thus, Theodore H. Price, in *Commerce and Finance*, calls Mr. Hoover's plan "probably the most important domestic economic announcement published in years." Brookmire says that its chief result may be "to stabilize the bond market. . . . It is not felt that this so-called pool is of decisive importance, either in the bond market or in the general situation."

Harvard Economic Society finds the move "too late to have a stimulating effect on autumn business, since the period of seasonal expansion is now terminating, but likely to be beneficial to business as well as to financial conditions in coming months."

Alexander Hamilton Institute expects from it "two important consequences." The first is psychological—restoration of confidence; the second is tangible—liquefying bank assets so that credit may again flow freely, and legitimate enterprise may not be hampered in its endeavor to work back to normal." That organization refers to dissent to the Hoover plan "on the ground that this is a first step toward inflation and in that direction danger lies."

But *Commerce and Finance* says "Deflation having been carried so absurdly far, the present plans might better be termed *anti-deflationary* than inflationary." And "the prosperity to which we believe ourselves entitled will not make itself felt until commerce can be provided with a stable medium of exchange acceptable in every market in the world."

Brookmire looks for further de-

cline in the pound sterling and thinks that "considerable time will elapse before it can again be stabilized." Meantime, in America, we must adjust railroad and building wage rates. "Apparently a long struggle lies ahead over this issue," but it will have to be done "before there can be any important recovery in building activity."

A huge business, despite conditions, is still going forward, *Annalist* reminds us, quoting F. W. Dodge Corp., in putting this year's construction at four billions. "The world never stops." And industry in general has adjusted itself to present verities and its "costs to the limitations of present markets. . . . The stock market, also, is apparently deflated." But "various influences of wide scope retard business." Europe is here indicated.

Such declines as have occurred in recent domestic lines are held by Harvard Economic Society to have largely avoided consumer goods. "Those lines supplying ordinary necessities . . . were comparatively well sustained."

More time will be required to work out of the depression, Brookmire thinks, placing the start of sustained recovery in the spring or summer of 1932.

Meantime our steady losses of gold, through export and earmarking, seem to be doing no good. Mostly, they are going to France, which took more than 81 per cent of the total exported from Sept. 1 to Oct. 16. And France does not need gold. Says Harvard: "If the gold exports had been moving to the countries from which we [earlier] received 'distress' gold, that would be a welcome development, since they would contribute to a better distribution of the world's gold supply."

suction centrifugal pumps with horizontally-split casings.

Gasoline Locomotive.—Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, Ohio. Bulletin T L F, 12 pages. Describes and illustrates a line of gasoline locomotives equipped with Ford engines and four-speed truck transmission. They are made in 2½ to 4-ton sizes.

Dust Filters.—W. W. Sly Mfg. Co., Cleveland. Bulletin S-80, eight pages. This describes and illustrates a new dust filter. One feature of this is that the envelopes or filtering mediums are kept under tension at all times. Another is that the cleaning device which vibrates the cloth envelopes is said to remove the dust very rapidly. This, it

is pointed out, results in a reduction in maintenance and shutdown periods are reduced to a minimum. A feature of interest to users of the company's old type of dust arrester is that the new filter unit is designed to fit the old dust arrester case, and provides an additional amount of filtering surface or the same amount of filter surface with a classifier ahead of the filtering unit.

Steel Bridge Flooring.—Carnegie Steel Co., Pittsburgh. Booklet. 21 pages, discusses T-Tri-Lok bridge flooring, a new form of concrete slab construction involving structural tees in combination with lighter plate bars mechanically interlocked with the tees as a rigid reinforcing structure. Engineering data and charts developed from

a number of tests on this form of construction are given.

Turbine-Generator Sets.—General Electric Co., Schenectady, N. Y. Illustrated folder describes turbine-generator sets built for 60-cycle operation at 240, 480, 600 or 2300 volts.

Lead.—Lead Industries Association, 420 Lexington Avenue, New York. Cloth-bound 104-page book, illustrated, entitled "Useful Information About Lead," tells concisely the story of lead and its principal uses. A charge of 50c. is made for each copy.

High-Temperature Mortars.—General Refractories Co., 106 South Sixteenth Street, Philadelphia. Booklet illustrates and describes company's high-temperature mortars and plastic chrome.

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